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SYSTEMATIC PLANT STUDIES



ADVERTISEMENT

The United States National Herbarium, which was founded by the Smithsonian Institution, was transferred in the year 1868 to the Department of Agriculture and continued to be maintained by that department until July 1, 1896, when it was returned to the official custody of the Smithsonian Institution. The Department of Agriculture, however, continued to publish the series of botanical reports entitled "Contributions from the United States National Herbarium," which it had begun in the year 1890, until, on July 1, 1902, the National Museum, in pursuance of an act of Congress, assumed responsibility for the publication. The first seven volumes of the series were issued by the Department of Agriculture.

ALEXANDER WETMORE,
Assistant Secretary, Smithsonian Institution.

SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS
FROM THE
UNITED STATES NATIONAL HERBARIUM

VOLUME 28

SYSTEMATIC PLANT STUDIES

CHASE, SMITH, TAYLOR, WALKER



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1942

DATES OF PUBLICATION

Volume 28 of the Contributions consists of four parts, which were issued as follows:

- Part 1, pages 1-310, June 28, 1929.
- 2, pages 311-547, June 27, 1932.
- 3, pages 549-562, June 12, 1940.
- 4, pages 563-675, July 22, 1941.

ERRATA

- Page 10, line 26: For "151" read "15".
- Page 11, line 21: For "Decumbentes" read "Decumbentia."
- Page 17, line 5 from bottom: For "10" read "26", and for "1854" read "1853."
- Page 17, line 4 from bottom: For "Wagnerianae" read "Wagenerianae."
- Page 91, line 25: For "Decumbentes" read "Decumbentia."
- Page 203, line 10 from bottom: For "1.9 cm." read "1.9 m."
- Page 565, line 18: For "Tsunobu" read "Tsugunobu."
- Page 600, line 40: For "scobiforma" read "scobiformia."
- Page 617, line 7 from bottom: For "*labragense*" read "*labrangense*."
- Page 625, line 28: For "cueneata" read "cuneata."
- Page 625, line 31: For "semi-inferius" read "semi-inferum."
- Page 625, line 38: For "innovationis" read "innovationibus."
- Page 634, line 21: For "1880" read "1800."
- Page 635, line 1: For "*hyogaeus*" read "*hypogaeus*."
- Page 638, line 15: For "Desv." read "Desr."
- Page 640, line 3: For "Piasetsk's" read "Piasetski's."
- Page 644, line 3: For "Piesetski's" read "Piasetski's."
- Page 645, line 33: For "Hippophae" read "Hippophaë."
- Page 646, line 8: For "*Chamaenirion*" read "*Chamaenerion*."
- Page 648, line 7 from bottom: For "35" read "351."
- Page 654, line 16: For "*wrightiana*" read "*wightiana*."
- Page 655, line 11: For "*siberica*" read "*sibirica*."
- Page 656, line 12 from bottom: Insert "2:" after "Pl.," and for "1805" read "1807."
- Page 662, line 17: For "1757" read "1767."
- Page 663, line 20 from bottom: For "23" read "24."

P R E F A C E

Volume 28 of the Contributions consists of four parts. The first of these, published in 1929, entitled "The North American Species of *Paspalum*," by Agnes Chase, at that time associate agrostologist of the United States Department of Agriculture, is the result of several years' study of the grasses of this genus in the United States National Herbarium and a large amount of field work. The type specimens of American species described by European authors were studied in many European herbaria also, and in loans received from others.

The genus *Paspalum* contains a larger number of species than any other genus of grasses in North America with the exception of *Panicum*, and for the whole of America the two genera are about equal. *Paspalum* is well represented in continental United States, but it reaches its greatest development in tropical America, many species being common to North and South America. It is intended to present a revision of the South American species separately.

The author describes 140 species and 3 subspecies, of which 18 species are new. Each is accompanied by a text figure showing the inflorescence or part of it, the spikelet, and the fruit.

Part 2, by Dr. Albert C. Smith, is an account of the American species of the tribe Thibaudieae of the Vacciniaceae, the blueberry family. This group of plants is almost wholly confined to the New World Tropics, ranging from southern Mexico to British Guiana, northwestern Brazil, Bolivia, and Peru. The flowers of many of the species are exceptionally showy and form one of the outstanding features of the vegetation of the higher Andes, where the plants often occur in abundance. Because of their beauty many species have found their way into cultivation in Europe, and many more would without doubt have an equal horticultural value in the United States. In a few the fruit is edible, though it may scarcely be said to form an important part of the native diet.

The present treatment, which is based primarily upon material in the United States National Herbarium, including specimens collected by recent expeditions of the Smithsonian Institution, in two of which the author participated, takes into account also the specimens found in several other of the larger American herbaria and the historically important collections preserved at Kew and Berlin, which were lent. In all, 20 genera and 240 species are recognized. Of these, 3 genera and 75 species are here described as new.

The third part is a short paper by Dr. William Randolph Taylor, of the University of Michigan, reporting upon the marine algae collected during the voyage of the square-rigged ship *Joseph Conrad* on the Smithsonian-Hartford Expedition to the West Indies, 1937. The collection, made upon 15 islands, embraces 72 species, which are enumerated. The list is preceded by a brief account of earlier studies of West Indian algae. No new species are described.

The concluding paper, by Dr. Egbert H. Walker, assistant curator in the National Herbarium, deals with the plants collected in southern Mongolia and Kansu Province, China, in 1923 by R. C. Ching, who was employed to conduct the botanical work of the National Geographic Society's second scientific expedition in central China under the direction of Dr. F. R. Wulsin. It consists of a systematic enumeration of the species collected, with field notes by the collector, together with Mr. Ching's report on the work of the botanical party and an account of the vegetation of Kansu Province. The collection, consisting of 1,158 numbers (with many duplicates), was presented to the National Museum, and has been identified by Dr. Walker, with the exception of the special groups mentioned.

Mr. Ching's explorations, together with those of Reginald Farrer (1914-15) and, more recently, Dr. Joseph F. Rock (1925-27), Kinshen Hao (1930), and others, have added so much to our knowledge that Kansu Province can no longer be called the botanically least known part of China. These collections and observations are important records of an interesting and diverse vegetation, which is rapidly disappearing with the steady destruction of the forests.

WILLIAM R. MAXON,
Curator, United States National Herbarium.

April 25, 1942.

CONTENTS

	Page
THE NORTH AMERICAN SPECIES OF PASPALUM. By Agnes Chase	1
Introduction.....	1
Basis and methods of work.....	1
Type specimens.....	2
Species, subspecies, and forms.....	2
Geographical distribution.....	3
Text figures.....	3
Economic importance of <i>Paspalum</i>	3
History and limitation of the genus.....	5
Description of the genus and species.....	7
Doubtful species.....	238
Excluded species.....	239
List of new species and new names.....	241
Index to numbered specimens.....	242
THE AMERICAN SPECIES OF THIBAUDIEAE. By Albert C. Smith	311
Introduction.....	311
Historical consideration.....	312
Economic consideration.....	315
Geographic distribution.....	316
Morphological discussion.....	317
Relation of Thibaudieae to the family.....	319
Generic groups.....	321
Thibaudia and its allies.....	323
Macleania and its allies.....	325
Siphonandra and its allies.....	327
Cavendishia and its allies.....	330
Descriptive list, with keys.....	331
List of new genera, new species, and new names.....	533
Index to numbered specimens.....	535
MARINE ALGAE OF THE SMITHSONIAN-HARTFORD EXPEDITION TO THE WEST INDIES, 1937. By William Randolph Taylor	549
Introduction.....	549
List of species.....	552
Myxophyceae.....	552
Chlorophyceae.....	552
Phaeophyceae.....	554
Rhodophyceae.....	555
Literature cited.....	560
PLANTS COLLECTED BY R. C. CHING IN SOUTHERN MONGOLIA AND KANSU PROVINCE, CHINA. By Egbert H. Walker	563
Introduction.....	563
Survey of botanical exploration in Kansu.....	565
Principal publications on Kansu, mostly botanical.....	566
Localities visited.....	568

VIII CONTRIBUTIONS FROM THE NATIONAL HERBARIUM

PLANTS COLLECTED—Continued.	Page
Report of the expedition. By R. C. CHING-----	573
Organization of the expedition-----	574
Route of the botanical party-----	575
Wang Yeh Fu to Ningsia-----	575
Lanchow to Hsi Ning-----	576
Hsi Ning to Old T'ao Chou-----	578
Old T'ao Chou to Cho Ni-----	581
Cho Ni to Lanchow-----	584
General observations-----	585
The vegetation of Kansu-----	585
Principal botanical areas-----	588
Ho Lan Shan-----	589
Lien Ch'eng-----	590
Old T'ao Chou-----	591
Lien Hua Shan-----	592
Systematic enumeration of species-----	593
INDEX-----	677

ILLUSTRATIONS

PLATES

	Page
PLATE 1. <i>Lateropora ovata</i> A. C. Smith.....	548
2. <i>Ceratostema lobbii</i> A. C. Smith.....	548
3. <i>Ceratostema spectabile</i> Rusby.....	548
4. <i>Semiramisia speciosa</i> (Benth.) Klotzch.....	548
5. <i>Englerodoxa calycina</i> (Benth. & Hook.) A. C. Smith.....	548
6. <i>Gonocalyx portoricensis</i> (Urban) A. C. Smith.....	548
7. <i>Periclesia flexuosa</i> A. C. Smith.....	548
8. <i>Macleania amplexicaulis</i> A. C. Smith.....	548
9. <i>Psammisia globosa</i> A. C. Smith.....	548
10. <i>Psammisia ferruginea</i> A. C. Smith.....	548
11. <i>Anthopterus bracteatus</i> A. C. Smith.....	548
12. <i>Thibaudia archeri</i> A. C. Smith.....	548
13. <i>Thibaudia regularis</i> A. C. Smith.....	548
14. <i>Themistoclesia vegasana</i> A. C. Smith.....	548
15. <i>Cavendishia spicata</i> A. C. Smith.....	548
16. <i>Cavendishia obtusa</i> A. C. Smith.....	548
17. <i>Orthaea constans</i> A. C. Smith.....	548
18. <i>Lysiclesia caudata</i> A. C. Smith.....	548
19. <i>Satyria minutiflora</i> A. C. Smith.....	548
20. <i>Melobesia membranacea</i> and <i>Fosliella farinosa</i> var. <i>solmsiana</i>	562
21. Map of Kansu and Inner Mongolia, showing route of R. C. Ching in 1923.....	564
22. A, R. C. Ching supervising the loading of a pack mule with botanical equipment. B, The ethnological party halting for lunch on the Tibetan grasslands.....	572
23. A, One of the many canals on the great Ningsia Plain on the north side of the Yellow River, where much rice is grown. B, A small temple at the desert's edge south of Chung Wei Hsien.....	573
24. A, The Golden Stupa of Labrang. B, Some of the temples of Labrang with surrounding hills.....	580
25. A, The city of Old T'ao Chou with its surrounding barren hill-sides terraced and cultivated almost to the summit. B, The T'ao Ho looking downstream from the top of a ridge in the T'ao Valley showing the forested hills.....	581
26. A, The Shih Men, or Rock Gate, into Tebbu Land, worn by the "Kaichou" or "Wutu" through a limestone barrier at 9,700 feet altitude. B, The Great Shih Men, or Great Rock Gate, leading into Tebbu Land, in the Min Shan Range at 11,500 feet altitude.....	588
27. The densely forested Ta Kou, or Big Gorge, southwest of the Tibetan village A Chüan.....	589

	TEXT FIGURES	Page
FIGURE 1.	<i>Paspalum stellatum</i>	16
2.	<i>P. heterotrichon</i>	18
3.	<i>P. trachycoleon</i>	19
4.	<i>P. cymbiforme</i>	21
5.	<i>P. humboldtianum</i>	22
6.	<i>P. pectinatum</i>	25
7.	<i>P. contractum</i>	26
8.	<i>P. sanguineolentum</i>	27
9.	<i>P. dissectum</i>	29
10.	<i>P. serratum</i>	30
11.	<i>P. acuminatum</i>	31
12.	<i>P. repens</i>	33
13.	<i>P. longicuspe</i>	35
14.	<i>P. prostratum</i>	36
15.	<i>P. candidum</i>	37
16.	<i>P. scabrum</i>	38
17.	<i>P. racemosum</i>	39
18.	<i>P. crassum</i>	40
19.	<i>P. vaginatum</i>	43
20.	<i>P. distachyon</i>	46
21.	<i>P. distichum</i>	48
22.	<i>P. paucispicatum</i>	52
23.	<i>P. pubiflorum</i>	54
24.	<i>P. pubiflorum glabrum</i>	56
25.	<i>P. lividum</i>	57
26.	<i>P. hartwegianum</i>	59
27.	<i>P. alcalinum</i>	60
28.	<i>P. crinitum</i>	61
29.	<i>P. mutabile</i>	61
30.	<i>P. tinctum</i>	62
31.	<i>P. arsenei</i>	63
32.	<i>P. notatum</i>	64
33.	<i>P. minus</i>	67
34.	<i>P. pumilum</i>	68
35.	<i>P. subciliatum</i>	69
36.	<i>P. serpentinum</i>	70
37.	<i>P. lineare</i>	72
38.	<i>P. longepedunculatum</i>	75
39.	<i>P. setaceum</i>	77
40.	<i>P. debile</i>	78
41.	<i>P. supinum</i>	79
42.	<i>P. psammophilum</i>	81
43.	<i>P. stramineum</i>	82
44.	<i>P. pubescens</i>	84
45.	<i>P. ciliatifolium</i>	87
46.	<i>P. propinquum</i>	90
47.	<i>P. rigidifolium</i>	91
48.	<i>P. decumbens</i>	93
49.	<i>P. nutans</i>	95
50.	<i>P. dispar</i>	96
51.	<i>P. peckii</i>	97
52.	<i>P. pilosum</i>	98
53.	<i>P. unispicatum</i>	100

ILLUSTRATIONS

XI

		Page
FIG.	54. <i>P. monostachyum</i>	101
	55. <i>P. adoperiens</i>	102
	56. <i>P. culiacanum</i>	103
	57. <i>P. langei</i>	106
	58. <i>P. variabile</i>	108
	59. <i>P. palmeri</i>	109
	60. <i>P. botterii</i>	111
	61. <i>P. affine</i>	112
	62. <i>P. tenellum</i>	113
	63. <i>P. jaliscanum</i>	115
	64. <i>P. tonduzii</i>	115
	65. <i>P. costaricense</i>	116
	66. <i>P. virletii</i>	117
	67. <i>P. nesiotes</i>	118
	68. <i>P. squamulatum</i>	119
	69. <i>P. oligostachyum</i>	120
	70. <i>P. lentiginosum</i>	121
	71. <i>P. yucatanum</i>	122
	72. <i>P. paniculatum</i>	124
	73. <i>P. blodgettii</i>	128
	74. <i>P. caespitosum</i>	129
	75. <i>P. molle</i>	131
	76. <i>P. umbratile</i>	132
	77. <i>P. acutifolium</i>	133
	78. <i>P. bakeri</i>	133
	79. <i>P. laxum</i>	135
	80. <i>P. pleostachyum</i>	137
	81. <i>P. rocanum</i>	138
	82. <i>P. alterniflorum</i>	139
	83. <i>P. rottboellioides</i>	140
	84. <i>P. filiforme</i>	141
	85. <i>P. distortum</i>	142
	86. <i>P. lindenianum</i>	143
	87. <i>P. nanum</i>	144
	88. <i>P. insulare</i>	145
	89. <i>P. rupestre</i>	146
	90. <i>P. saugetii</i>	147
	91. <i>P. capillifolium</i>	148
	92. <i>P. multicaule</i>	149
	93. <i>P. pictum</i>	151
	94. <i>P. clavuliferum</i>	152
	95. <i>P. parviflorum</i>	153
	96. <i>P. standleyi</i>	154
	97. <i>P. microstachyum</i>	155
	98. <i>P. breve</i>	156
	99. <i>P. edmondi</i>	156
	100. <i>P. orbiculatum</i>	158
	101. <i>P. jimenezii</i>	159
	102. <i>P. hitchcockii</i>	160
	103. <i>P. reptatum</i>	161
	104. <i>P. amphicarpum</i>	162
	105. <i>P. conjugatum</i>	164
	106. <i>P. conjugatum pubescens</i>	168

	Page
FIG. 107. <i>P. dilatatum</i>	171
108. <i>P. urvillei</i>	175
109. <i>P. fasciculatum</i>	177
110. <i>P. laeve</i>	181
111. <i>P. longipilum</i>	183
112. <i>P. circulare</i>	184
113. <i>P. praecox</i>	187
114. <i>P. lentiferum</i>	188
115. <i>P. erectum</i>	190
116. <i>P. difforme</i>	191
117. <i>P. floridanum</i>	192
118. <i>P. giganteum</i>	196
119. <i>P. virgatum</i>	198
120. <i>P. conspersum</i>	200
121. <i>P. acutum</i>	201
122. <i>P. plenum</i>	202
123. <i>P. nelsoni</i>	204
124. <i>P. secans</i>	205
125. <i>P. arundinaceum</i>	207
126. <i>P. millegrana</i>	208
127. <i>P. densum</i>	210
128. <i>P. coryphaeum</i>	212
129. <i>P. plicatulum</i>	216
130. <i>P. wrightii</i>	219
131. <i>P. motembense</i>	220
132. <i>P. leptachne</i>	220
133. <i>P. centralis</i>	221
134. <i>P. convexum</i>	223
135. <i>P. melanospermum</i>	225
136. <i>P. boscianum</i>	226
137. <i>P. malacophyllum</i>	229
138. <i>P. gardnerianum</i>	230
139. <i>P. pulchellum</i>	232
140. <i>P. bifidum</i>	234
141. <i>P. fimbriatum</i>	235
142. <i>P. saccharoides</i>	237
143. Probable phylogeny of Thibaudieae.....	322
144. <i>Juncus exploratorum</i>	601

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UNITED STATES NATIONAL HERBARIUM

VOLUME 28, PART 1

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By AGNES CHASE

JUN 28 1929



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON: 1929

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WASHINGTON : 1929

ISSUED JUN 28 1929

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM

II

PREFACE

The accompanying paper, entitled "The North American Species of *Paspalum*," by Agnes Chase, associate agrostologist of the United States Department of Agriculture, is the result of several years' study of the grasses of this genus in the United States National Herbarium and a large amount of field work. The type specimens of American species described by European authors have been studied in many European herbaria also, and in loans received from others. This opportunity is taken to acknowledge the many courtesies extended by curators of the herbaria visited. The genus *Paspalum* contains a larger number of species than any other genus of grasses in North America with the exception of *Panicum*, and for the whole of America the two genera are about equal. *Paspalum* is represented in continental United States by 43 species, but it reaches its greatest development in tropical America. Many species are common to North and South America, for which reason it has been necessary to study the South American material as well. It is intended to present a revision of the South American species separately.

Several species of *Paspalum* are important forage grasses and one is a troublesome weed in drainage canals.

The author describes 140 species and 3 subspecies, of which 18 species are new. Each is accompanied by a text figure showing the inflorescence or part of it, the spikelet, and the fruit.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

CONTENTS

	Page
Introduction	1
Basis and methods of work	1
Type specimens	2
Species, subspecies, and forms	2
Geographical distribution	3
Text figures	3
Economic importance of <i>Paspalum</i>	3
History and limitation of the genus	5
Description of the genus and species	7
Doubtful species	238
Excluded species	239
List of new species and new names	241
Index to numbered specimens	242
Index	xi

ILLUSTRATIONS

TEXT FIGURES

	Page
FIGURE 1. <i>Paspalum stellatum</i>	16
2. <i>P. heterotrichon</i>	18
3. <i>P. trachycoleon</i>	19
4. <i>P. cymbiforme</i>	21
5. <i>P. humboldtianum</i>	22
6. <i>P. pectinatum</i>	25
7. <i>P. contractum</i>	26
8. <i>P. sanguineolentum</i>	27
9. <i>P. dissectum</i>	29
10. <i>P. serratum</i>	30
11. <i>P. acuminatum</i>	31
12. <i>P. repens</i>	33
13. <i>P. longicuspe</i>	35
14. <i>P. prostratum</i>	36
15. <i>P. candidum</i>	37
16. <i>P. scabrum</i>	38
17. <i>P. racemosum</i>	39
18. <i>P. crassum</i>	40
19. <i>P. vaginatum</i>	43
20. <i>P. distachyon</i>	46
21. <i>P. distichum</i>	48
22. <i>P. paucispicatum</i>	52
23. <i>P. pubiflorum</i>	54

	Page
FIGURE 24. <i>P. pubiflorum glabrum</i>	56
25. <i>P. lividum</i>	57
26. <i>P. hartwegianum</i>	59
27. <i>P. alcalinum</i>	60
28. <i>P. crinitum</i>	61
29. <i>P. mutabile</i>	61
30. <i>P. tinctum</i>	62
31. <i>P. arsenei</i>	63
32. <i>P. notatum</i>	64
33. <i>P. minus</i>	67
34. <i>P. pumilum</i>	68
35. <i>P. subciliatum</i>	69
36. <i>P. serpentinum</i>	70
37. <i>P. lineare</i>	72
38. <i>P. longepedunculatum</i>	75
39. <i>P. setaceum</i>	77
40. <i>P. debile</i>	78
41. <i>P. supinum</i>	79
42. <i>P. psammophilum</i>	81
43. <i>P. stramineum</i>	82
44. <i>P. pubescens</i>	84
45. <i>P. ciliatifolium</i>	87
46. <i>P. propinquum</i>	90
47. <i>P. rigidifolium</i>	91
48. <i>P. decumbens</i>	93
49. <i>P. nutans</i>	95
50. <i>P. dispar</i>	96
51. <i>P. peckii</i>	97
52. <i>P. pilosum</i>	98
53. <i>P. unispicatum</i>	100
54. <i>P. monostachyum</i>	101
55. <i>P. adoperiens</i>	102
56. <i>P. culiacanum</i>	103
57. <i>P. langei</i>	106
58. <i>P. variabile</i>	108
59. <i>P. palmeri</i>	109
60. <i>P. botterii</i>	111
61. <i>P. affine</i>	112
62. <i>P. tenellum</i>	113
63. <i>P. jaliscanum</i>	115
64. <i>P. tonduzii</i>	115
65. <i>P. costaricense</i>	116
66. <i>P. virletii</i>	117
67. <i>P. nesiotes</i>	118
68. <i>P. squamulatum</i>	119
69. <i>P. oligostachyum</i>	120
70. <i>P. lentiginosum</i>	121
71. <i>P. yucatanum</i>	122
72. <i>P. paniculatum</i>	124
73. <i>P. blodgettii</i>	128
74. <i>P. caespitosum</i>	129
75. <i>P. molle</i>	131

	Page
FIGURE 76. <i>P. umbratile</i>	132
77. <i>P. acutifolium</i>	133
78. <i>P. bakeri</i>	133
79. <i>P. laxum</i>	135
80. <i>P. pleostachyum</i>	137
81. <i>P. rocanum</i>	138
82. <i>P. alterniflorum</i>	139
83. <i>P. rottboellioides</i>	140
84. <i>P. filiforme</i>	141
85. <i>P. distortum</i>	142
86. <i>P. lindenianum</i>	143
87. <i>P. nanum</i>	144
88. <i>P. insulare</i>	145
89. <i>P. rupestre</i>	146
90. <i>P. saugetii</i>	147
91. <i>P. capillifolium</i>	148
92. <i>P. multicaule</i>	149
93. <i>P. pictum</i>	151
94. <i>P. clavuliferum</i>	152
95. <i>P. parviflorum</i>	153
96. <i>P. standleyi</i>	154
97. <i>P. microstachyum</i>	155
98. <i>P. breve</i>	156
99. <i>P. edmondi</i>	156
100. <i>P. orbiculatum</i>	158
101. <i>P. jimenezii</i>	159
102. <i>P. hitchcockii</i>	160
103. <i>P. reptatum</i>	161
104. <i>P. amphicarpum</i>	162
105. <i>P. conjugatum</i>	164
106. <i>P. conjugatum pubescens</i>	168
107. <i>P. dilatatum</i>	171
108. <i>P. urvillei</i>	175
109. <i>P. fasciculatum</i>	177
110. <i>P. laeve</i>	181
111. <i>P. longipilum</i>	183
112. <i>P. circulare</i>	184
113. <i>P. praecox</i>	187
114. <i>P. lentiferum</i>	188
115. <i>P. erectum</i>	190
116. <i>P. difforme</i>	191
117. <i>P. floridanum</i>	192
118. <i>P. giganteum</i>	196
119. <i>P. virgatum</i>	198
120. <i>P. conspersum</i>	200
121. <i>P. acutum</i>	201
122. <i>P. plenum</i>	202
123. <i>P. nelsoni</i>	204
124. <i>P. secans</i>	205
125. <i>P. arundinaceum</i>	207
126. <i>P. millegrana</i>	208
127. <i>P. densum</i>	210

	Page
FIGURE 128. <i>P. coryphaeum</i> -----	212
129. <i>P. plicatulum</i> -----	216
130. <i>P. wrightii</i> -----	219
131. <i>P. motembense</i> -----	220
132. <i>P. leptachne</i> -----	220
133. <i>P. centralis</i> -----	221
134. <i>P. convexum</i> -----	223
135. <i>P. melanospermum</i> -----	225
136. <i>P. boscianum</i> -----	226
137. <i>P. malacophyllum</i> -----	229
138. <i>P. gardnerianum</i> -----	230
139. <i>P. pulchellum</i> -----	232
140. <i>P. bifidum</i> -----	234
141. <i>P. fimbriatum</i> -----	235
142. <i>P. saccharoides</i> -----	237

THE NORTH AMERICAN SPECIES OF PASPALUM

By AGNES CHASE

INTRODUCTION

BASIS AND METHODS OF WORK

The revision of *Paspalum* here offered is based primarily upon the collections in the United States National Herbarium. The collections of *Paspalum* in several of the large herbaria of this country and in Europe have also been examined. As in other groups, nearly all the early descriptions of American species of *Paspalum* were published by European authors. It has been necessary, therefore, to seek the basis of their work in European herbaria. The writer studied the collections in several of the herbaria listed in the revision of *Panicum*,¹ and visited besides Freiburg, where, at the Botanical Institute, is preserved Doell's own herbarium; Leiden, where types of Persoon and Steudel are preserved in the Rijks Herbarium; and Pisa, where Raddi's types are preserved at the University.

The Hackel Herbarium, listed in the revision of *Panicum* under Attersee, the home of Prof. Eduard Hackel, is now in the Natural History Museum in Vienna.

Dr. J. Daveau kindly lent for study the collections of *Paspalum* in the Institut Botanique, Montpellier, and Dr. René Viguiier those in the Institut Botanique at Caen.

The plants studied by Flügge, author of *Graminum Monographiae*, Part 1, *Paspalus* (Reimaria), published in 1810, have not been located. Johann Flügge was a physician of Hamburg. He appears to have used the Willdenow Herbarium, preserved in the herbarium of the Botanical Museum in Dahlem, Berlin, at least for the Humboldt and Bonpland collections. In the herbarium of the British Museum are a number of grasses from the herbarium of Ernst Ferdinand Nolte, with labels bearing names and data agreeing with those in Flügge's work, the plants themselves agreeing with the descriptions. According to Murray and Britten² the British Museum purchased a selection of plants from the Nolte Herbarium in 1875, the year of

¹ Contr. U. S. Nat. Herb. 15: 2-4. 1910.

² Hist. Coll. Nat. Hist. Brit. Mus. 1: 171. 1904.

Nolte's death. Nolte seems to have purchased a number of classic herbaria, the collections of Forskål, Cavanilles, Delile, and Allioni, being among those in his herbarium. It may be that he purchased Flügge's herbarium. Flügge's name nowhere appears on the specimens examined in the British Museum.

TYPE SPECIMENS

Like the revision of *Panicum* the work on *Paspalum* has been done on a type basis. For a discussion of this method of work the reader is referred to the revision of *Panicum* and especially to Hitchcock's revision of *Agrostis*.³ The basis of each name, valid or synonymous, is stated in each case, and also the herbarium in which the type specimen is preserved.

SPECIES, SUBSPECIES, AND FORMS

The attitude expressed in the revision of *Panicum*⁴ has been strengthened during subsequent years. Judgment concerning the taxonomic rank of groups of *Paspalum* has been based on a great amount of herbarium material and on somewhat extended field work. In some species, such as *Paspalum coryphaeum*, field work has shown that what in the herbarium appear to be fairly distinct species are not even taxonomic forms, but phases, from young simple plants to old branching ones, or habitat forms. Others, like *P. laeve* and *P. plicatulum*, might be divided into a great number of varieties and forms, but having so divided them it would still be difficult to assign many plants to any particular form, the characters failing to make constant combinations. The fact seems to be that the species actually are variable in length of leaf, pubescence, and, within narrow limits, size of spikelet. Some, such as the allies of *Paspalum setaceum*, form a network of closely related species. The entire Setacea group might be reduced to one or two species with subspecies, varieties, subvarieties, and forms, and the Laevia to another, but I do not see that greater definiteness would be gained thereby. A name is the expression of a taxonomic idea.⁵ If it were obvious which of the species involved was the parent and which the descendants, and the order of their descent, it would express a taxonomic idea to make the parent form a species with the others ranged under it, according to their descent. But the study of a vast amount of material in the field and in the herbarium does not indicate any definite descent. I surmise the parent form is long since extinct, that *P. ciliatifolium*, *P. pubescens*, and *P. stramineum* are brothers, that the others are cousins in various

³ U. S. Dept. Agr. Bur. Pl. Ind. Bull. 68: pp. 12-14. 1905.

⁴ Hitchc. & Chase, Contr. U. S. Nat. Herb. 15: 7. 1910.

⁵ Greene, Landmarks of Botanical History, 122. (Smithsonian Misc. Coll. 54: no. 1870.) 1909.

degrees removed. Darwin's diagram⁶ best expresses the case. To place *P. pubescens* as a subspecies of *P. ciliatifolium*, with *P. stramineum* and *P. supinum* under that as varieties, and *P. setaceum* as another subspecies, with *P. debile* and *P. longepedunculatum* as varieties under it, would express an exactness of relationship that the facts do not at all warrant. All we can truthfully say is that the species are closely related and appear to intergrade, whether by hybridization or by reverting to ancestral forms we do not know.

It may be, as some geneticists hold, that there are far more real species than we recognize, but if these "elementary" species can not be recognized, it seems needless to cumber bibliography with them. The descriptions are based on the great majority of plants studied, and specimens that disagree slightly with these descriptions are cited as exceptional or intermediate.

GEOGRAPHICAL DISTRIBUTION

The species of *Paspalum*, numbering probably nearly 400, are plants of the Tropics and warm temperate regions, especially of the Western Hemisphere, and are particularly abundant in Brazil. The genus extends to the northern United States, but no species are known from Canada or from the Rocky Mountains north of Colorado. Two littoral species and two tropical weedy ones are of world-wide distribution but are undoubtedly of American origin. The relatively few species not native to the Americas are mostly allies of *Paspalum scrobiculatum* L. and related to our dark-fruited species of the *Plicatula* group. The species of *Paspalum* are found in various habitats from sandy coasts, marshes, savannas, and prairies, to forested or brushy slopes, where some assume a clambering habit. In much of the high campos of Brazil *Paspalum* is the dominant genus of grasses.

TEXT FIGURES

Each species is illustrated by a text figure showing a portion of the inflorescence, only enough to suggest its general character, natural size, two views of the spikelet and one view of the fruit magnified 10 diameters. The four full page habit drawings were made by Mary Wright Gill, the other figures by the author.

ECONOMIC IMPORTANCE OF PASPALUM

Paspalum is one of the most economically important genera of *Paniceae*, the tribe to which it belongs, only *Panicum*, containing the common millet, *Chaetochloa* (*Setaria*), containing the foxtail millets, and *Pennisetum*, containing pearl millet and elephant or Napier grass, exceeding it in value.

⁶ Origin of Species, chap. 4, opposite p. 90, Amer. ed. 1887.

A large number of native perennial species of *Paspalum*, especially *P. circulare*, *P. laeve*, and related species, and *P. pubescens* and its allies furnish excellent grazing from the Middle Western States southward. They are mostly late summer and fall grasses, furnishing fresh forage when earlier pasture grasses are dry or have been consumed. *Paspalum pubiflorum* and more particularly *P. pubiflorum glabrum* are excellent drought-resistant pasture grasses in the Gulf States and northward to Kentucky and Oklahoma. They, as well as *P. laeve* and *P. circulare*, are cut for hay to a limited extent. The chief value of the native perennials, however, is for grazing. *Paspalum boscianum*, commonly called bull-grass or bull-paspalum, a succulent annual, furnishes good hay in the Southeastern States, where it makes abundant volunteer growth in fields after cultivation of the crops has ceased. It reseeds freely and is not planted. It is especially valuable for dairy cows, but is hard to cure unless dried on frames.

Paspalum dilatatum, widely known as paspalum-grass, water-paspalum, water-grass, or more commonly simply paspalum, and in recent years as Dallis grass, was introduced into the southern United States from Uruguay or Argentina about the middle of the last century and is now common throughout the Gulf States where it is considered a valuable pasture grass especially for dairy cattle, furnishing excellent late summer and autumn feed, withstanding close grazing, and not being injured by moderate frosts. It is most important in northern and central Georgia, Alabama, and Mississippi, where it is cut for hay as well as grazed. The names water-paspalum and water-grass are misleading because, though this species is naturally a plant of moist lowlands, records show that it stands extreme drought where there is a good rainfall at some time of the year. In the Hawaiian Islands, particularly on the island of Hawaii, and in Guam *Paspalum dilatatum*, introduced from the Southern States, is building up a livestock industry. In the Philippine Islands it is widely planted by dairymen and ranchers for pasture, but is not cut for hay.

Paspalum urvillei, Vasey grass, is related to *P. dilatatum* and was introduced somewhat later from Uruguay or southern Brazil. It is coarser and taller than *P. dilatatum*, and though readily grazed while young, becomes woody and unpalatable with age. In some sections of the South, particularly Arkansas and Louisiana, it is cut for hay. It was introduced into Australia and South Africa, where it is now regarded as a useful fodder grass. The early introductions of this grass into the British dominions were misidentified as *Paspalum virgatum* and that name still persists, an unfortunate error, true *P. virgatum* being one of the unpalatable group called in Spanish America "cortaderia" because of the razor-edged blades. The name *P.*

virgatum for *P. urvillei* has recently found its way into Hawaiian agricultural literature.

Paspalum notatum has been introduced as a pasture grass in the Gulf States under the name Bahia grass. It is proving of value, especially in Florida, thriving on both clayey and sandy soil and being readily grazed. It forms the main constituent of native pasture in Cuba and Porto Rico and in parts of Costa Rica, southern Brazil, Uruguay, and Argentina. It has recently been introduced into East Africa and is said to furnish excellent lowland pasture in Uganda. *Paspalum notatum* is coming into use for golf courses in the West Indies and in Panama, because it forms a tough heavy turf even on rather light sandy soil.

Less important are the native *Paspalum lividum* and *P. hartwegianum* in Texas and Mexico. The latter has recently been grown in Mississippi as a forage grass. It is sensitive to frost but is promising for pasture along the Gulf Coast.

Paspalum vaginatum is an important soil binder on low sandy coasts in the Tropics and sub-Tropics, and *P. distichum*, known as knotgrass, jointgrass, and Fort Thompson grass, is a valuable soil binder along streams subject to erosion in the Tropics and sub-Tropics. It furnishes excellent grazing in flat regions near the coast. In the West it is spreading along irrigation ditches and sometimes invades rice fields in California. In Australia it is known as water-couch and siltgrass. It is there regarded as a valuable grass on alluvial flats.

A wide-spread aquatic species, *Paspalum repens*, floating-paspalum or water-paspalum, is sometimes a water weed, making dense growth in drainage canals in the Southern States. It has recently been reported as troublesome in the Panama Canal Zone where it is choking the outlet of Pedro Miguel River and affording a breeding place for mosquitoes. This species is, however, greedily eaten by cattle wherever they have access to it, the animals wading far into the water to get it. It would seem that cattle might be utilized to hold this grass in check or to exterminate it if desirable.

Paspalum conjugatum a common widely creeping species of the Tropics and sub-Tropics, not grazed by cattle where other forage is available, makes a fairly good grass for golf grounds in southern Louisiana.

According to W. L. McAtee, of the Biological Survey, the seeds of paspalum are eaten by a large number of birds, wild ducks and bobwhites especially feeding on them extensively.

HISTORY AND LIMITATION OF THE GENUS.

The genus *Paspalum* was first known from American plants. There are but two known pre-Linnaean figures of *Paspalum*, both cited by Linnaeus under *Panicum dissectum*, the first species of

Paspalum described. Neither belongs to this species. The first, Plukenet's "Gramen paniceum, spica simplici, ad caulem intervallata, binis granorum ordinibus uno versu constante *Americanum*," plate 350, figure 2,⁷ is unidentifiable, but may be *Paspalum boscianum*. The figure seems to be meant to illustrate the American species cited by Linnaeus and also "Gramen paniceum distachyophoron s. spica gamella, binis granorum ordinibus uno versu constante Ind. Orient. Ponnevaragupille *Malabarorum*," coupled with it by Plukenet. The latter phrase name probably refers to *Paspalum scrobiculatum* and the figure may have been intended for that, though Linnaeus did not cite it when later he described *P. scrobiculatum*. The second pre-Linnaean figure, Sloane's "Gramen dactylon majus, panicula longa, spicis plurimis nudis crassis," plate 69, figure 2,⁸ is *Paspalum virgatum*, and is later cited by Linnaeus under that species.

In the *Species Plantarum* (1753) Linnaeus included the one species of *Paspalum* known to him in *Panicum*, describing the genus *Paspalum* in 1759, with four species, all still retained in the genus. The type species,⁹ the earliest described, belongs to a relatively small group, in which the rachis is foliaceous-winged.

Subsequent authors expanded the genus to include species of other groups. Lamarck¹⁰ included species of *Syntherisma* (*Digitaria*), *Axonopus*, *Eriochloa*, and *Cynodon* (*Capriola*), and was followed by Poiret.¹¹ Flüge¹² includes all these except *Cynodon*. Kunth, Trinius, and Nees, in their various works, and most subsequent authors retain species of *Axonopus* in *Paspalum*, but place *Syntherisma* in *Panicum*, mostly as section *Digitaria*, or recognize it as a genus under the name *Digitaria* Scop. or *Syntherisma* Walt. Hooker¹³ and a few other modern authors retain *Syntherisma* in *Paspalum*. *Eriochloa* H. B. K. and *Cynodon* Pers. (or *Capriola* Adans.) have been generally recognized as distinct genera. Bentham and Hooker¹⁴ and Hackel¹⁵ include *Cabrera* and *Anastrophus* as sections of *Paspalum*. Chase¹⁶ differentiates *Axonopus* Beauv., with *A. compressus* (Swartz) Beauv. as the type, on the reversed position of the subsessile, solitary spikelet, with *Anastrophus* Schlecht. as a synonym and *Cabrera* Lag. (including *A. aureus*) as a section.

⁷ Plukenet, Mant. 94. pl. 350. f. 2. 1700.

⁸ Sloane, Cat. Pl. Jam. 34. 1696; Voy. Jam. 1: 112. pl. 69. f. 2. 1707.

⁹ See page 7.

¹⁰ Tabl. Encycl. 1: 175-176. 1791.

¹¹ In Lam. Encycl. 4: 28-35. 1804.

¹² Monogr. Pasp. 1810.

¹³ Fl. Brit. Ind. 7: 10-20. 1896.

¹⁴ Gen. Pl. 3: 1098. 1883.

¹⁵ In Engl. & Prantl, Pflanzenfam. 2¹: 35. 1887.

¹⁶ Proc. Biol. Soc. Washington 24: 129-136. 1911.

Nash¹⁷ recognizes *Anastrophus* Schlecht. for *A. compressus* and its close allies, and *Axonopus* Beauv., taking *A. aureus* Beauv. as the type, for this species and its allies, distinguished by long stiff golden hairs on the rachis. Stapf¹⁸ recognizes *Axonopus* Beauv., including *A. compressus*, as distinct from *Paspalum*.

In the present paper *Axonopus* Beauv., including *Anastrophus* Schlecht. and *Cabrera* Lag., is excluded from *Paspalum*, and *Dimorphostachys* Fourn., once recognized as a genus by Nash¹⁹ but later²⁰ included by him in *Paspalum*, is included in this genus.²¹

One well-marked subgenus, *Ceresia*, is here recognized. This is connected with *Paspalum* proper by the group *Dissecta* (the subsection *Pseudoceresia* of Benthams and Hooker). The species are grouped and arranged to indicate their affinity, so far as possible in a lineal sequence. Some groups, such as *Setacea* and *Leavia*, are natural aggregations of closely related species; the constituents of other groups are less obviously allied. Four species having no close allies are left ungrouped.

DESCRIPTION OF THE GENUS AND SPECIES

PASPALUM L.

Paspalum L. Syst. Nat. ed. 10. 2: 855. 1759. Following a brief diagnosis four species are given: *Paspalum dimidiatum*, *P. virgatum*, *P. paniculatum*, and *P. distichum*. All agree with the diagnosis and all are to-day included in the genus. *Paspalum dimidiatum*, which is based on *Panicum dissectum* L. Sp. Pl. 57, 1753, being the earliest species described, is taken as the type. Linnaeus does not explain the change of the specific name. The sheet in the Linnaean Herbarium bears both names in his writing, "*dimidiatum*" being crossed out. In the second edition of the Species Plantarum the name is changed to *Paspalum dissectum*.²² The masculine form *Paspalus* was used by Flüge,²³ by Roemer & Schultes,²⁴ and by Nees.²⁵

Sabsab Adans. Fam. Pl. 2: 31, 599. 1763. No species are given. "*Paspalum* Lin." is cited as synonym.

Cleachne Roland in Rottb. Act. Lit. Univ. Hafn. 1: 285. 1778. This name is given as a synonym of *Paspalum* in a list of plants of Surinam, with three names without description.

¹⁷ In Small, Fl. Southeast. U. S. 79. 1903; N. Amer. Fl. 17: 161-164. 1912.

¹⁸ In Prain, Fl. Trop. Afr. 9: 565. 1919.

¹⁹ In Small, Fl. Southeast. U. S. 78. 1903.

²⁰ N. Amer. Fl. 17: 179-180. 1912.

²¹ For discussion of generic synonyms see pp. 7 to 9, and for further discussion of generic characters see p. 9 and Chase, Proc. Biol. Soc. Washington 24: 129-132, 137-141. 1911.

²² For further discussion of *Paspalum* and generic synonyms see Chase, Notes on Genera Paniceae IV. Proc. Biol. Soc. Washington 24: 137-141. 1911.

²³ Monogr. Pasp. 51-190. 1810.

²⁴ Syst. Veg. 2: 290-317. 1817.

²⁵ Agrost. Bras. 18-82. 1829.

Ceresia Pers. Syn. Pl. 1: 85. 1805. A brief diagnosis is given and a single species, *C. elegans* Pers., is cited. This name is based on "*Paspalum membranaceum* Lam. ill. gen. 177. t. 43. f. 2. Hab. in Peru." The generic diagnosis appears to be taken from Lamarck's specific description, but slightly rearranged. Lamarck's specimen was examined in the Paris Herbarium. The name is invalidated by *Paspalum membranaceum* Walt. 1788, and the species has been renamed *Paspalum ceresia* (Kuntze) Chase. It is related to *P. stellatum* Humb. & Bonpl., but is not known from North America.

Reimaria Flügge, Monogr. Pasp. 213. 1810. Three species are included, *R. candida* Humb. & Bonpl., *R. elegans* Humb. & Bonpl., and *R. acuta* Humb. & Bonpl. The first two are species of *Paspalum* in which both glumes are wanting; the first, *R. candida*, is taken as the type of *Reimaria*. The third species, to which the generic description less aptly applies, has been made the type species of *Reimarochloa* Hitchc.

Paspalanthium Desv. Opusc. 59. 1831. A single species, *P. stoloniferum* Desv., based on *Paspalum stoloniferum* Bosc, is included. This is the same as *Paspalum racemosum* Lam.

Moenchia Wender in Steud. Nom. Bot. ed. 2. 2: 153. 1841. Not *Moenchia* Roth. 1788. There is no description, a single nomen nudum, *M. speciosa* Wender, being given as a synonym of *Panicum saccharoides* Kunth (upon which is based *Paspalum saccharoides* Nees).

Anachyris Nees, Journ. Bot. Kew Misc. 2: 103. 1850. A single species, *A. paspaloides* Nees, "In Brasilia. Gardner, n. 4031 in herb. Lindl.," is included. This specimen is the same as *Paspalum malacophyllum* Trin. (see page 228). Steudel²⁶ spells the name *Anachyrium*.

Maizilla Schlect. Bot. Zeit. 8: 601, 605. 1850. A single species, "*M. stolonifera* Bosc. sub *Paspalo*," is included. This is the same as *Paspalum racemosum* Lam.

Cymatochloa Schlecht. Bot. Zeit. 12: 817, 821. 1854. Two names, "*C. fluitans* (*Ceresia fluitans* Ell.)," and "*C. repens* (*Paspalum repens* Berg.)," are given. Both names apply to the same species, *Paspalum repens* Berg.

Dimorphostachys Fourn. Compt. Rend. Acad. Sci. Paris 80: 441. 1875. This genus is proposed because of the presence of the first glume of the spikelet, this glume in the lower of the pair of spikelets being larger than in the upper. The author says the group contains eleven species, but four of which he mentions, *Panicum monostachyum* H. B. K., *Paspalum pilosum* Lam., *Paspalum oajacense* Steud., and *Paspalum pedunculatum* Poir. Fournier does not here actually transfer any species to *Dimorphostachys*. His first-named species, which we take as the type, was, together with the others given in his posthumous work,²⁷ published under this genus by Hemsley,²⁸ as *D. monostachya* Fourn., based on *Panicum monostachyum* H. B. K., which is the same as *Paspalum pilosum* Lam.

Wirtgenia Nees; Doell in Mart. Fl. Bras. 2²: 40. 1877. "*Wirtgenia paspaloides* Nees ab Esenb. in herb. Reg. Berolin.," a herbarium name for the species Nees published as *Anachyris paspaloides*, is here given as a synonym of *Paspalum malacophyllum* Trin.

Digitaria Heist. has been included by the writer²⁹ in the synonymy of *Paspalum*. The name is first published by Fabricius³⁰ as follows: "*Digitaria* Heist. *Dactylis* Rai. *Gramen dactylon majus panicula longa, spicis pluribus nudis*

²⁶ Syn. Pl. Glum. 1: 33. 1854.

²⁷ Mex. Pl. 2: 14-16. 1886. See p. 20 for discussion of date.

²⁸ Biol. Centr. Amer. Bot. 3: 499. 1885.

²⁹ Proc. Biol. Soc. Washington 24: 137. 1911.

³⁰ Pl. Hort. Helmst. 207. 1759.

crassis. Sloane." This phrase name in Sloane³¹ refers to the species described as *Paspalum virgatum* by Linnaeus, who cites the same Sloane phrase name and illustration. As shown by Hitchcock,³² however, this citation is to be regarded as an error, a misidentification, rather than the basis of the name, the plant in Helmstadt, Bavaria, to which the name was applied, being undoubtedly the common crabgrass, *Digitaria sanguinalis* (L.) Scop., or *Syntherisma sanguinalis* (L.) Dulac. The reference to Ray leads back to a group of finger-grasses including *Hyparrhenia hirta* (L.) Stapf, *Cynodon dactylon* (L.) Pers., *Syntherisma sanguinalis*, and others. The Sloane citation being rejected, the name *Digitaria* does not apply to *Paspalum*.

Syllepis Fourn. is included in the synonymy of *Paspalum* by Nash.³³ Fournier³⁴ cites "Sacchari species anomala Kunth, Enum. 1, 475," and includes two Mexican species. The Kunth species are *Saccharum contractum* Humb. & Bonpl., *S. dubium* Humb. & Bonpl., and *S. caudatum* Meyer, all now referred to *Imperata*. The Mexican species included in *Syllepis* are *S. polystachya*, based on *Saccharum polystachyum* Swartz, therefore a typonym of *Paspalum saccharoides* Nees, and *S. ruprechtii*, without description, but with specimens cited showing it to be *Imperata brasiliensis* Trin. Under *Syllepis polystachya* Fournier cites Gouin's no. 56 from Vera Cruz, which we have not seen, and Wright "in herb. Durand" from Texas, which is probably a duplicate of *Imperata hookeri* Rupr., collected in what is now New Mexico, by Wright (no. 2101). We take *Syllepis ruprechtii* as the type of the genus, referring *Syllepis* to *Imperata* as a synonym. This is the disposition made of it by Bentham & Hooker.³⁵

DESCRIPTION

Inflorescence of 1 to numerous simple spikelike racemes along a simple common axis; spikelets plano-convex, or sometimes unequally biconvex or concavo-convex, sessile or short-pedicelled, solitary or in pairs, in two rows on one side of a narrow or winged rachis, the back of the fertile lemma (the convex side of the spikelet) toward it; first glume typically wanting, regularly present in one group and in a few other species, occasionally developed in others; second glume and sterile lemma usually similar, the glume suppressed in a relatively few species; fruit commonly obtuse, the lemma and palea chartaceous-indurate, rarely but slightly so, the margin of the lemma inrolled at maturity, a lunate line of thinner texture at the back just above the base, the radicle protruding through this at germination; stamens three, styles two, stigmas plumose.

Annual or perennial grasses, of various habit, confined to the warmer regions of both hemispheres, mostly American.

In the United States most of the species flower in late summer and autumn.

The characters of chief generic value are the strictly racemose inflorescence, the plano-convex or slightly concavo-convex spikelets in which the first glume is wanting, and the obtuse indurate fruit, the margin of the lemma inrolled, taken in combination. But in this large genus, though well marked as a whole, there are many species in which one or more of these characters fail. The suppression of the first glume, by which Linnaeus distinguished *Paspalum*, "gluma 2-valvis," from *Panicum*, "gluma uniflora trivalvis," and which has been generally accepted as the principal generic character by subsequent authors, is the least

³¹ Voy. Jam. 1: 112. pl. 69. f. 2. 1707.

³² Rhodora 29: 114-116. 1927.

³³ N. Amer. Fl. 17: 165. 1912.

³⁴ Mex. Pl. 2: 52. 1886.

³⁵ Gen. Pl. 3: 1125. 1883.

reliable. In a majority of the species an occasional spikelet may be found with the first glume developed. In *Paspalum distichum* such spikelets are common, in *P. vaginatum* frequent. In the group Decumbentes, including *Dimorphostachys* Fourn., the first glume is usually developed unequally, being small to nearly obsolete on the primary spikelet (the upper) of a pair and large on the secondary spikelet. They are exceedingly variable in size in a single raceme. The second glume also is suppressed in *Paspalum candidum* and its allies and in a few other species. This usually holds for a species, but in *P. multicaule* and in the South American *P. pallidum* H. B. K. spikelets in a single raceme are found, some with and some without the second glume. Throughout this paper the second glume refers to that organ even though the first is wholly wanting. The "third glume" or "third scale" of various authors is here called the sterile lemma.

Species of *Paspalum* have commonly been described as having spikelets in two rows or in three or four rows. The spikelets are always in two rows on one side of the rachis, but in a great many species the pedicel is actually a branch, bearing a primary spikelet at its summit and a secondary spikelet on a short branchlet or pedicel. Such spikelets crowded together appear to be in four rows; when less densely crowded, with one of each pair turned toward the center of the raceme they appear to be in three rows.

KEY TO SPECIES AND GROUPS

Rachis membranaceous or foliaceous, mostly broad and winged. (Scarcely winged in a few species with silky spikelets.)

Spikelets clothed with long silky hairs or conspicuously fringed with long hairs. (See also *Dilatata* and *Conjugata* with narrow rachis.) See SUBGENUS *Ceresia*, p. 15.

Spikelets glabrous (or minutely pubescent in *P. repens*). Rachis foliaceous, green. See *Dissecta*, p. 28.

Rachis not membranaceous, foliaceous, or winged. (Slightly winged in a few species but, if so, spikelets not silky.)

Inflorescence a large flabellate panicle of numerous racemes. Spikelets solitary.

Spikelets glabrous or minutely ciliate.....107. *P. fasciculatum*.

Spikelets obscured by their long silky hairs.....140. *P. saccharoides*.

Inflorescence not flabellate.

Racemes 2, conjugate or nearly so at the summit of the culm, rarely a third below. (Racemes 2 to 5 in *P. paucispicatum*.)

Spikelets elliptic to narrowly ovate.

Plants with creeping rhizomes or stolons. See *Disticha*, p. 41.

Plants tufted, not rhizomatous or stoloniferous.

Spikelets not transversely wrinkled.....36. *P. lineare*.

Spikelets transversely wrinkled.....87. *P. insulare*.

Spikelets suborbicular, broadly ovate or obovate.

Spikelets concavo-convex, sparsely long-silky around the margin; plant stoloniferous.

Racemes usually not more than 12 cm. long; spikelets 1.4 to 1.8 mm. long.....104. *P. conjugatum*.

Racemes usually more than 12 cm. long; spikelets mostly 2 mm. long.
104a. *P. conjugatum pubescens*.

Spikelets plano-convex (rarely biconvex), not silky margined; plants not stoloniferous.

Plants annual, small, slender; spikelets not more than 1.5 mm. long.

Spikelets orbicular, some of them beaded with globular hairs.

91. *P. multicaule*.

Spikelets obovate, glabrous or minutely pubescent.

Glume and sterile lemma narrower than the fruit, exposing it,
spotted with black-----92. *P. pictum*.

Glume and sterile lemma covering the fruit, not spotted.

93. *P. clavuliferum*

Plants perennial; spikelets 1.8 to 3 mm. long.

Spikelets golden-brown, transversely marked with dark lines.

35. *P. serpentinum*.

Spikelets green, not marked. See *Notata*, p. 63.

Racemes 1 to many, racemose or fascicled on the axis, not conjugate.

Second glume wanting.

Fruit smooth and shining-----137. *P. pulchellum*.

Fruit minutely papillose.

Pedicels bearing stiff hairs as long as the spikelets; fertile lemma
not ridged-----136. *P. gardnerianum*.

Pedicels without stiff hairs; fertile lemma prominently ridged.

135. *P. malacophyllum*.

Second glume developed.

First glume developed on at least one of the pair of spikelets.

Spikelets turgidly biconvex-----138. *P. bifidum*.

Spikelets plano-convex. See *Decumbentes*, p. 91.

First glume normally wanting (rarely developed on occasional spike-
lets).

Racemes terminal and axillary, the axillary sometimes hidden in the
sheaths; terminal inflorescence of 1 to 3, rarely to 6, racemes.

Plants rooting at the lower nodes-----48. *P. nutans*.

Plants erect to widely spreading but not rooting at the nodes.

See *Setacea*, p. 73.

Racemes terminal on the primary culm or leafy branches, no truly
axillary racemes. (A flowering branch, with a leaf reduced to
the sheath and wholly concealed in the parent sheath, sometimes
found in *P. laxum*, *P. laeve* and others, simulates an axillary
raceme).

Plants annual.

Spikelets with a broad firm notched margin.

139. *P. fimbriatum*.

Spikelets not so margined.

Spikelets not more than 1.5 mm. long, elliptic; fruit pale.

Racemes 6 to 35-----96. *P. microstachyum*.

Racemes 1 to 4. See *Parviflora*, p. 148.

Spikelets 2 to 3 mm. long; fruit dark brown.

Spikelets 2.4 to 3 mm. long, commonly appressed-pubescent.

132. *P. convexum*.

Spikelets not more than 2.2 mm. long, glabrous.

Rachis scarcely 1 mm. wide--133. *P. melanospermum*.

Rachis 2 to 2.5 mm. wide-----134. *P. boscianum*.

Plants perennial.

Racemes solitary, subcylindric; spikelets solitary (sometimes
paired in *P. sauguetii*).

Plants stoloniferous. Culms rarely more than 10 cm. tall.

Glume and sterile lemma not beaked or wrinkled.

97. *P. breve*.

Glume and sterile lemma beaked beyond the fruit, deeply
wrinkled-----98. *P. edmondi*.

Plants not stoloniferous.

Sterile lemma wrinkled or crumpled. See **Filiformia**, p. 140.

Sterile lemma not wrinkled or crumpled.

Spikelets 3 to 3.3 mm. long, pubescent at least toward the margin and base. See **Alterniflora**, p. 138.

Spikelets not more than 1.8 mm. long.

Blades not more than 1 mm. wide, concavo-convex or subterete in cross section.

Plants delicate; blades capillary, subterete.

90. **P. capillifolium**.

Plants wiry; blades concavo-convex.

83. **P. filiforme**.

Blades or some of them 2 mm. or more wide; flat or involute.

Spikelets elliptic, glabrous..... 88. **P. rupestre**.

Spikelets oval, pubescent..... 89. **P. saugatii**.

— Racemes 2 to many.

Glume and sterile lemma conspicuously crumpled.

85. **P. lindenianum**.

Glume and sterile lemma not crumpled or but slightly so.

Plants creeping, rooting at the nodes.

Spikelets 3.5 mm. long, in pairs... 22. **P. paucispicatum**.

Spikelets not more than 2.5 mm. long (except subterranean spikelets of *P. amphicarpum*), solitary.

Plants not stoloniferous, the culms decumbent and rooting at base; fruit pale..... 67. **P. squamulatum**.

Plants stoloniferous; fruit reddish at maturity. See **Orbiculata**, p. 157.

Plants not creeping, sometimes rooting at 1 or 2 nodes of a decumbent base, if so, spikelets in pairs.

Spikelets conspicuously silky-ciliate around the margin, the hairs as long as the spikelet or longer. See **Dilatata**, p. 169.

Spikelets not conspicuously ciliate.

Fruit dark brown and shining; spikelets glabrous or minutely appressed-pubescent. See **Plicatula**, p. 213.

Fruit pale to stramineous (brown but not shining in *P. virgatum* and *P. conspersum*).

Plants robust; culms commonly more than 1 meter, often 2 meters, tall (less than 1 meter in *P. difforme*). Spikelets normally in pairs.

Culms freely branching. Racemes 10 to 45; spikelets elliptic, glandular-pubescent.

126. **P. coryphaeum**.

Culms simple or with a few simple branches.

Blades firm, with sharp-cutting edges; racemes mostly more than 15 (5 to 10 in *P. secans* with elliptic spikelets).

Sheaths, at least the lower, harshly hispid.

Rachis not ciliate..... 60. **P. affine**.

Sheaths not hispid (except in *P. nelsoni* with long-ciliate rachis). See **Virgata**, p. 196.

Blades relatively lax, the edges not cutting; racemes rarely more than 5. Spikelets orbicular or broadly obovate.

Spikelets obovate, turgidly plano-convex. See **Floridana**, p. 190.

Spikelets orbicular, depressed-lenticular.
Glume and sterile lemma thin in texture.
Spikelets 2.2 to 2.5 mm. (rarely to 2.8 mm.)
long; foliage not conspicuously villous.

111. **P. praecox.**

Spikelets 2.7 to 3.4 mm. long; lower sheaths
and blades mostly conspicuously villous,
at least at base. 112. **P. lentiferum.**

Plants not robust; if more than one meter tall culms
relatively slender.

Spikelets suborbicular or broadly obovate, or broad-
ly oval.

Spikelets 2.2 to 4 mm. long, glabrous.

Spikelets turgidly plano-convex, 3.5 to 4 mm.
long. 114. **P. difforme.**

Spikelets depressed plano-convex or lenticular,
2.2 to 3.4 mm. long. See **Laevia**, p. 178.

Spikelets not more than 2 mm. long.

Spikelets 2 mm. long.

Racemes thick; spikelets depressed rounded-
obovate. 28. **P. mutabile.**

Racemes slender; spikelets turgidly obovate.
Blades lax, velvety.

68. **P. oligostachyum.**

Blades stiff, glabrous beneath, scabrous
above. 66. **P. nesiotes.**

Spikelets not more than 1.8 mm. long, hemi-
spheric. See **Paniculata**, p. 117.

Spikelets elliptic to oval or obovate.

Blades elongate, involute, not more than 2 mm.
wide. See **Alterniflora**, p. 138.

Blades not elongate and involute, or, if so, much
wider.

Culms decumbent at base, rooting at the lower
nodes (occasional plants in dry situations
erect), branching.

Sheaths, at least the lower, harshly hispid.
59. **P. botterii.**

Sheaths not hispid, softly pubescent in some
species. See **Livida**, p. 53.

Culms erect to spreading, not rooting at the
nodes.

Spikelets not more than 1.8 mm. long
(sometimes 2 mm. in *P. laxum*).

Spikelets in pairs. See **Caespitosa**, p. 126.

Spikelets solitary (occasionally paired in
P. saugettii).

Racemes 3 or 4; nodes glabrous.

95. **P. standleyi.**

Racemes 1 or 2; nodes pubescent.

89. **P. saugettii.**

Spikelets 2 mm. or more long.

Blades firm, folded at base, more or less involute-margined. Plants in hard tufts.

Spikelets 3 mm. long. See *Livida*, p. 53.

Spikelets 2.1 to 2.5 mm. long.

Culms erect; rachis 1.2 to 1.5 mm. wide-----80. *P. rocanum*.

Culms stiffly ascending to spreading; rachis less than 1 mm. wide.

Blades 2 to 15 cm. long, rarely longer; spikelets 2.1 mm. long.

77. *P. bakeri*.

Blades 12 to 55 cm. long; spikelets 2.2 to 2.5 mm. long.

79. *P. pleostachyum*.

Blades relatively lax, flat.

Blades 1 to 2.5 cm. wide (sometimes slightly less in *P. coryphaeum*).

Spikelets elliptic, subacute.

Culms 1 to 4 meters tall; racemes 10 to 45--126. *P. coryphaeum*.

Culms mostly less than 1 meter tall; racemes not more than 10.

64. *P. costaricense*.

Spikelets elliptic-obovate.

Second glume shorter than the spikelet; racemes usually fewer than 10-----59. *P. botterii*.

Second glume covering the fruit; racemes 10 to 30--60. *P. affine*.

Blades not more than 1 cm. wide (occasionally wider in *P. pubiflorum*).

Foliage velvety-pubescent throughout-----61. *P. tenellum*.

Foliage not velvety-pubescent.

Rachis more than 1 mm. wide. Racemes thick. See *Livida*, p. 53.

Rachis less than 1 mm. wide.

Second glume papillose-pubescent-----62. *P. jaliscanum*.

Second glume glabrous or very sparsely pubescent, not papillose.

Spikelets ovate, 2 mm. long.

65. *P. virletii*.

Spikelets elliptic or ovate-elliptic, 2.1 to 2.8 mm. long.

Glume and sterile lemma delicate in texture, equal.

27. *P. crinitum*.

Glume and sterile lemma not delicate, the glume shorter, exposing the fruit.

63. *P. tonduzii*.

SUBGENUS *Ceresia* (Pers.) Reichenb. Consp. Veg. 49. 1828

Erect or clambering perennials; blades firm, narrow; racemes 1 to several; rachis membranaceous, mostly broadly winged (narrowly winged to nearly wingless in *P. cymbiforme*, *P. humboldtianum* and *P. sanguineolentum*); spikelets clothed with long silky hairs or conspicuously fringed with long hairs; fruit pale. Plants of upland savannas.

Second glume broadly winged; sterile lemma fringed with long hairs.

Rachis narrower than the spikelets; glume cordate at base.

6. *P. pectinatum*.

Rachis wider than the spikelets; glume not cordate.-----7. *P. contractum*

Second glume not winged; sterile lemma inconspicuously fringed.

Rachis brightly colored, the margins golden to rufous; spikelets solitary.

Culms simple; racemes solitary or paired-----1. *P. stellatum*.

Culms branching; racemes not paired, 2 to 7 on the main culm, solitary on the branches-----2. *P. heterotrichon*.

Rachis dull, greenish, purplish, or brown; spikelets paired or solitary.

Rachis 4 to 5 mm. wide; culms robust, clambering. Racemes usually more than 8-----3. *P. trachycoleon*.

Rachis not more than 3 mm. wide; culms not robust and clambering.

Culms branching; rachis 2 to 3 mm. wide; spikelets fringed with spreading hairs.

Blades not ciliate, those of the primary culm not more than 7 mm. wide; fringing hairs of the spikelet rather silky, very unequal.

4. *P. cymbiforme*.

Blades papillose-ciliate, those of the primary culm mostly 8 to 12 mm. wide; fringing hairs of the spikelet stiff, about equal.

5. *P. humboldtianum*.

Culms simple; rachis 1 mm. wide; spikelets silky-villous, not stiffly fringed-----8. *P. sanguineolentum*.

1. *Paspalum stellatum* Humb. & Bonpl.

Paspalus stellatus Humb. & Bonpl. in Flüge, Monogr. Pasp. 62. 1810. "America meridionalis, Humboldt et Bonpland." Kunth³⁶ gives the locality of the Humboldt and Bonpland collection as "in radicibus Andium Novogranatensium, prope Ibague et La Palmilla," [Colombia.] Flüge states that there are two conjugate racemes, Kunth that the racemes are in pairs, rarely single. In the specimen so named in the Willdenow Herbarium labeled "Amer. merid. Humb." one culm bears one raceme, another two racemes. In the British Museum is a specimen labeled "*Paspalus stellatus* Monogr. p. 62. Amer. merid. H. & B. Willdenow 1809" which has two racemes. Both have coarsely hirsute foliage.

Paspalus stellatus var. *monostachyus* Nees, Agrost. Bras. 78. 1829. "In Brasilia australi (Sellow)." Nees divides the species into var. α *monostachyus* and var. β *distachyus*, though he states that even among the Humboldt specimens are several both *monostachyus* and *distachyus*. The Sello specimen named 'var. *monostachyus*' in Nees' script in the Berlin Herbarium has solitary racemes.

Paspalus stellatus var. *distachyus* Nees, Agrost. Bras. 78. 1829. "In apricis arenosis prope Tejuco (Langsdorff.—Vid. in Herb. Acad. Imp. Petrop. et Trin.)." The Langsdorff specimen has not been examined.

Paspalum cujabense Trin. Gram. Icon. 3: pl. 284. 1831. The figure is drawn from a Brazilian specimen, no further data given. The type specimen, in the

³⁶ H. B. K. Nov. Gen. & Sp. 1: 86. 1816.

Trinius Herbarium was collected by Langsdorff at Cuyabá. Trinius later³⁷ referred this to *P. stellatum*. As shown by an earlier plate³⁸ Trinius took *P. carinatum* Humb. & Bonpl. to be *P. stellatum*. The Langsdorff specimen is less pubescent than usual in *P. stellatum*. The name is spelled *P. cuyabense* by Doell.³⁹

Paspalum wagnerianum Schlecht. Linnaea 26: 133. 1853. "Sillae de Caracas (n. 396.)" Wagener. The type has not been located, but the description applies well to Pittier 7489, from near Caracas.

Paspalum splendens var. *sphacelatum* Hack. Oesterr. Bot. Zeitschr. 51: 239. 1901. "Brasilia, prov. Goyaz, Glaziou nr. 22550." The specimen cited, in the

Hackel Herbarium, is named "*Paspalum splendens* Hack." in Hackel's script, but it agrees with the description, differing from *P. splendens* in having a broadly winged rachis. The foliage is much less hirsute than usual in *P. stellatum*. Some culms bear two racemes, some one only.

Paspalum stellatum forma *hirsuta* Hack. in Stuck. Anal. Mus. Nac. Buenos Aires 21: 28. 1911. "St[uckert] no. 18,694 * * * Resistencia, Chaco," Argentina. The form is differentiated only by hirsute leaves. The type, in the Hackel Herbarium, has densely hirsute foliage.

DESCRIPTION

A tufted perennial; culms simple, erect or the base decumbent (the outer culms of a tuft sometimes spreading), 40 to 80 cm. tall, slender and wiry, glabrous or toward the summit appressed-pubescent; nodes obscurely appressed-pubescent or glabrate; sheaths mostly overlapping,

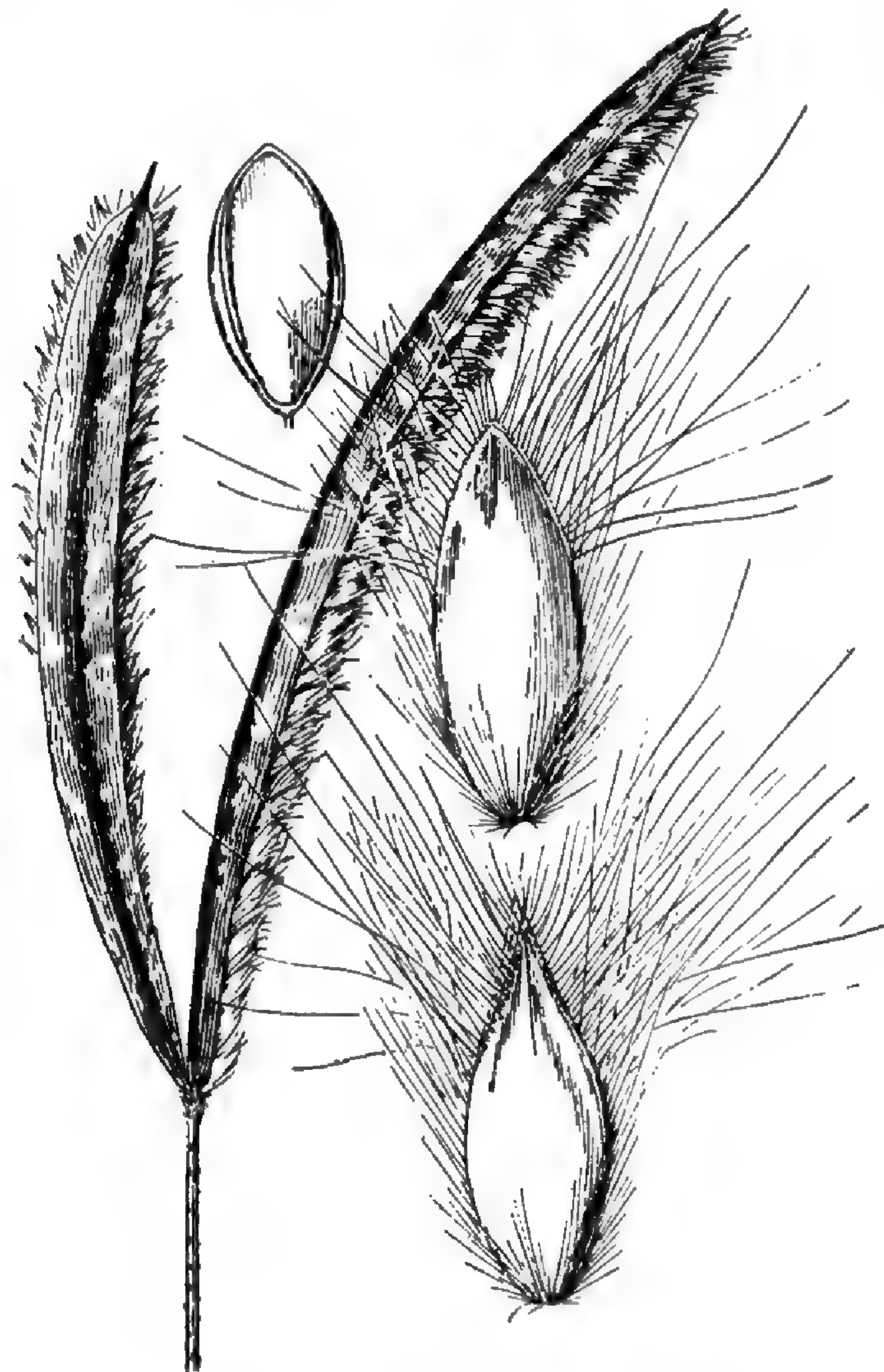


FIGURE 1.—*P. stellatum*. From Sello 5886

close-fitting, the lower papillose-hirsute (or becoming papillose only) the upper glabrous or nearly so; ligule membranaceous-ciliate, about 0.5 mm. long; blades erect (the junction with the sheath inconspicuous), 8 to 25 cm. long, 2 to 3 mm. wide at base (the uppermost reduced), involute-setaceous, papillose-pilose, or the lower surface glabrous; racemes solitary or paired, ascending, more or less falcate, 2.5 to 10 cm. long (rarely longer), the second shorter, commonly reduced to a rudiment represented by a papery brown scale subtending the single

³⁷ Mem. Acad. St. Petersb. VI. Sci. Nat. 1: 164. 1834.

³⁸ Trin. Gram. Icon. 1: pl. 119, 1828, corrected in the Corrigenda published in volume 3 of the same work, 1836.

³⁹ In Mart. Fl. Bras. 2: 94. 1877.

raceme; rachis 5 to 7 mm. wide, abruptly mucronate, glabrous or rarely sparsely pilose on the dull plum-colored keel, the papery winged margins golden-brown to purplish maroon, silvery-pubescent on the very short peduncle; spikelets solitary on minute radiately pilose pedicels, closely imbricate, the body of the spikelet almost hidden under the dense glistening white hairs, about 3 mm. long and 1.1 mm. wide, excluding the hairs, the base encircled by glistening white hairs about half as long as the spikelet; glume and sterile lemma subequal, obscurely 2 or 3 nerved (the midnerve of the lemma suppressed), fringed with glistening white hairs, those of the upper half arising from papillae and much exceeding the spikelet, the margins of the glume and lemma becoming slightly thickened and corky at maturity spreading the hairs radiately; fruit minutely stipitate, 2 mm. long, 1 mm. wide, obovate-elliptic, smooth and shining.

The name of this beautiful species refers to the radiate hairs of pedicels from which the spikelets have fallen.

DISTRIBUTION

Savannas and open rocky slopes, mostly between 500 and 1,500 meters altitude, southern Mexico and Hispaniola to Argentina.

OAXACA: Juquila, *Conzatti* 4364. Cauque, *Nelson* 3424. Teopisco, *Collins & Doyle* 124.

HONDURAS: Siguatepeque, *Standley* 55996, 56275.

EL SALVADOR: Volcán de San Salvador, *Calderón* 2272.

COSTA RICA: Boruca, *Pittier*⁴⁰ 4463.

PANAMA: Province of Coclé, *Pittier* 5020, 5064.

HAITI: St. Michel, *Leonard* 7289, 7526, 7537a. Between Morne Sala and Morne Basil, *Ekman* H 2484. Hinche, *Ekman* H 6428. Mirebalais, *Ekman* H 2302. Miragoâne, *Ekman* H 7246.

COLOMBIA: Santa Marta, *Smith* 142.

VENEZUELA: Caracas, *Bailey* 112; *Pittier* 7487, 7489. Guacara, *Pittier* 8169. Aragua, *Pittier* 11326. Galipán, *Pittier* 6201. Cojedes, *Pittier* 11998. Without locality, *Fendler* 2533.

BRAZIL: Caldas, *Regnell* III. 1344. Bello Horizonte, *Chase* 9308. Serra do Cipó, *Chase* 9100, 9253, 9295. Minas Geraes, *Claussen* 1020; *Glaziov* 17414, 20085; *Widgren* 887. Goyaz, *Gardner* 4030; *Glaziov* 22545, 22548, 22550. Pocos da Caldas, *Holway* 1708. São Paulo, *Gerdes*. Cuyabá, *Malme* 1562 E. Capão Grande, *Dusen* 4023, 8011. Without locality, *Glaziov* 22553 in part; *Riedel*; *Sello* 5656, 5686.

PARAGUAY: Río Apa, *Hassler* 11058. Trinidad, *Rojas* 2757. Cordillera de Altos, *Fiebrig* 664.

BOLIVIA: Buenavista, *Steinbach* 7103.

ARGENTINA: Posadas, *Ekman* 594, 595; *Parodi* 4515, 4664, 7070. Territorio del Formosa, *Jørgensen* 2882.

2. *Paspalum heterotrichon* Trin.

Paspalum heterotrichon Trin. Gram. Icon. 3: pl. 285. 1831. The figure is drawn from a Brazilian specimen; nothing further as to locality is given. The type specimen in the Trinius Herbarium is labeled "Brasil (absque loc.) Langsdorff 1829."

Paspalum (*Ceresia*) *gracile* Schlecht. Linnaea 10: 134. 1854. Not *P. gracile* Rudge 1805. Plantae Wagnerianae Columbicae no. 397, collected at "Sillae de

⁴⁰ Collections from Costa Rica bearing identical data and numbers have been distributed some with Pittier, some Tonduz as collector. Some are on the "Herb. Instit. physico-geogr. nat. costaricensis" label, some on Pittier & Durand label.

Caracas," Venezuela. The type has not been located. The description applies closely to *P. heterotrichon*.

Paspalum heterotrichum var. *paucispicatum* Hack. Notizbl. Bot. Gart. Berlin 1: 328. 1897. "Habitat in Haiti in montibus Furcy; *Picarda* n. 1525."

Differentiated from the typical form in having but 1 or 2 racemes. The type specimen, bearing the name in Hackel's script, in the Hackel Herbarium in Vienna, is an unusually slender plant.

DESCRIPTION

A tufted perennial; culms leafy, very slender, wiry, obscurely pubescent toward the almost filiform summit, otherwise glabrous, at first simple and erect, 50 to 90 cm. tall, later branching and leaning or clambering among other vegetation, the branches borne from the middle and upper nodes, sometimes repeatedly branching with short internodes and narrow blades, the whole forming a somewhat flabellate cluster; nodes bearded with appressed silky white hairs; sheaths mostly overlapping, close, silky pubescent along the margin, puberulent at the junction with the blade and with a fringe of white hairs 4 to 5 mm. long at the throat; blades spreading, firm, becoming involute at least toward the acuminate-setaceous apex, minutely puberulent on the upper surface, obscurely so or



FIGURE 2.—*P. heterotrichon*. From type specimen and Malme 1562 B

glabrous beneath; those of the primary culm 5 to 15 cm. long and 2 to 3.5 mm. wide, those of the branches 3 to 8 cm. long and about 2 mm. wide, the uppermost blades reduced to a setaceous point; racemes of the primary culm 2 to 7 (rarely 1) those of the branches usually solitary, ascending-falcate, 1 to 6 cm. long on short slender bearded pedicels, 1 to 2 cm. distant along a subfiliform slightly flexuous axis; rachis 3 to 4 mm. wide, glabrous, abruptly acuminate, the keel dull green, the thin membranaceous margins golden-ochraceous; spikelets solitary, closely imbricate, whitish, more or less obscured by the copious glistening white hairs, excluding these hairs about 2.5 mm. long, 0.8 mm. wide, elliptic, acute; glume subhyaline with 3 rather strong nerves, the marginal pair fringed with spreading white hairs from 1 to 2 mm. long, arising from papillae, a single hair from midway on each side stouter than the rest and as much as 3 mm. long, the glume also bearing just above the base a ring of hairs half as long as the spikelet, the sterile lemma narrower and slightly shorter than the glume, short-ciliate toward the apex, otherwise glabrous, 3-nerved, the midnerve lying in a sulcus extending from the base to half or two-thirds the length of the lemma; fruit but little indurate, 1.7 mm. long, 0.6 mm. wide, elliptic-lanceolate, very minutely puberulent at the apex.

DISTRIBUTION

Open grassy hillsides and savannas, at moderate altitudes, from Panama to Peru and southern Brazil; also in Haiti.

PANAMA: El Boquete, *Hitchcock* 8235, 8297. Chiriquí Volcano, *Killip* 4555.

HAITI: St. Michel, *Buch* 1091; *Leonard* 7537, 7793, 7795a. Mirebalais, *Ekman* H 2274. Ennery, *Leonard* 8957. Morne Faure, *Christ* 1800. Miragoâne, *Ekman* H 7247. Trouin, *Ekman* H 2401. Furcy, *Leonard* 4298.

COLOMBIA: Santa Marta, *Smith* 143.

VENEZUELA: Caracas, *Pittier* 7487. Tovar, *Fendler* 1698.

BRAZIL: Cuyabá, *Malme* 1562 B, 3153. Without locality, *Glaziov* 22576.

PERU: Yanano, *Macbride* 3749.

3. *Paspalum trachycoleon* Steud.

Paspalum trachycoleon Steud. Syn. Pl. Glum. 1: 28. 1854. "*Funck* nr. 742. Venezuela." The type specimen, with the name in Steudel's script in the Paris Herbarium, consists of a culm, without the base, 1 meter long, with 7 racemes.

DESCRIPTION

A somewhat woody suberect to clambering or trailing perennial; culms 1 to 2 meters tall, sometimes rather robust, branching from the middle and upper nodes, the branches elongate, leafy; internodes glabrous, yellowish; nodes bearded, the lower sometimes retrorsely so; foliage glaucous-olivaceous, the sheaths papillose-hirsute, or the uppermost glabrous; ligule membranaceous, brown, about 2 mm. long; blades ascending or spreading, firm, 10 to 18 cm. long, 8 to 15 mm. wide (the uppermost and those of the branches smaller), slightly narrowed to the base, or the upper sometimes subcordate, long-acuminate, densely papillose-velvety on both surfaces and with long stiff hairs at the base; panicles of 5 to 14, usually 9 to 12, ascending, straight or subfalcate racemes, 3 to 6 cm. long, approximate along a slender, softly pubescent, angled axis (this sometimes winged toward the summit); rachis herbaceous, 4 to 5 mm. wide, olive-green or purplish, usually pubescent on the midnerve and long-pilose at the base; spikelets 2.2 to 2.5 mm. long, abruptly pointed, pale, silky, mostly in pairs, densely imbricate, the whole forming a silvery shining mass; glume 2 or 3 nerved, the midnerve usually suppressed, clothed with long silky hairs except near the summit, densely ciliate on the upper half of the submarginal nerves, one hair on each nerve stronger than the rest and 2 to 3 mm. long, the others about 1 mm. long, the sterile lemma slightly inflated, glabrous, 3 to 5 nerved, sulcate down the middle toward the base; fruit about 2.2 mm. long and 0.9 mm. wide, acuminate, pilose at the tip, a few white hairs on the back of the lemma.

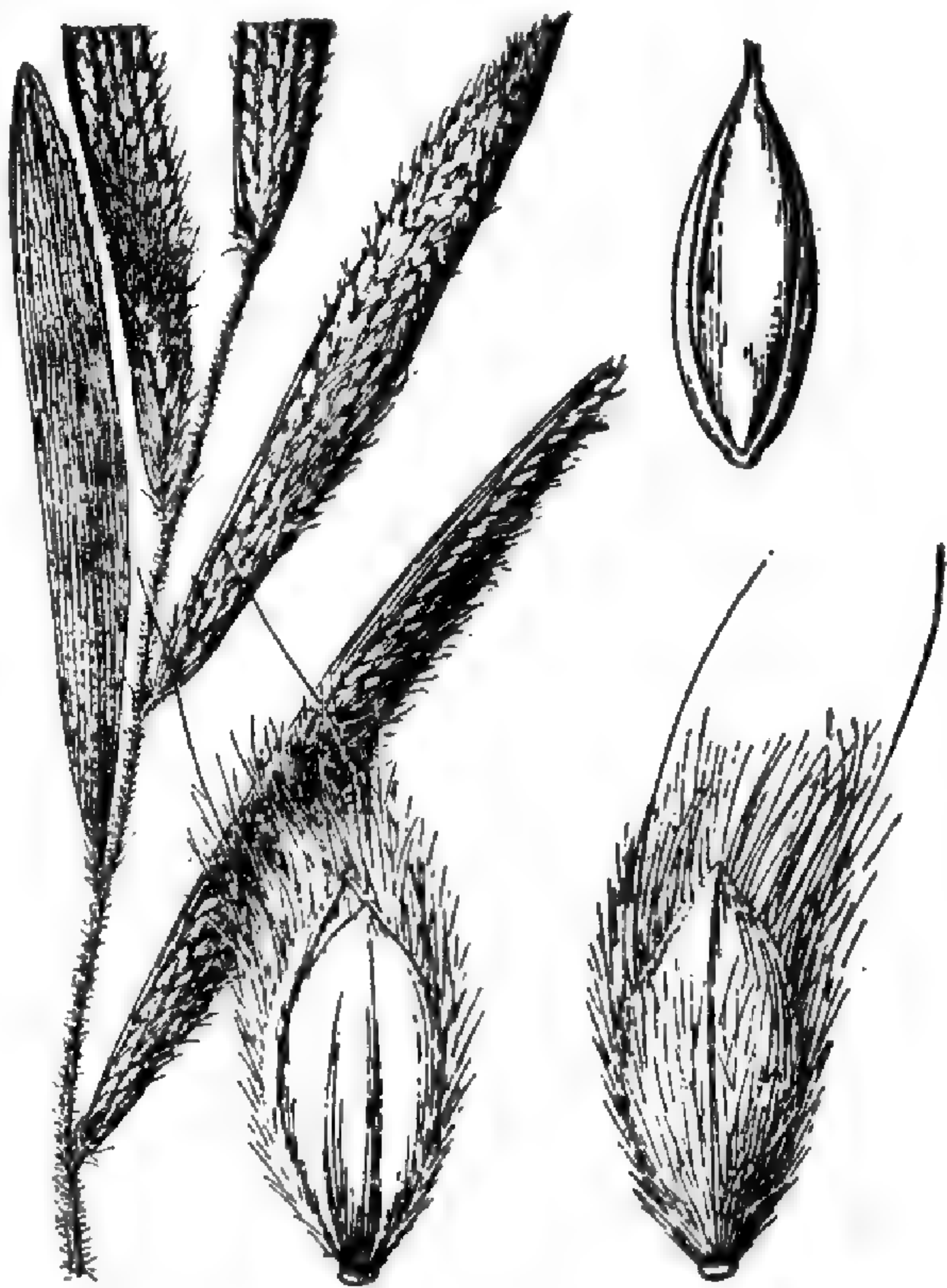


FIGURE 3.—*P. trachycoleon*. From *Linden* 1555

DISTRIBUTION

Open or brushy banks and slopes, mostly between 1,000 and 1,700 meters altitude, from Guatemala to Brazil.

GUATEMALA: Piedra Blanca de Qualán, *Pittier* 1788.

HONDURAS: Copán, *Pittier* 1832a.

EL SALVADOR: Volcano San Salvador, *Hitchcock* 8946.

COLOMBIA: Santa Marta, *Smith* 2170. Dept. Santander, *Killip & Smith* 16192, 19038. Dept. Huila, *Rusby & Pennell* 1014. "New Grenada," *Linden* 1555.

VENEZUELA: Mérida, *Moritz* 1537. Tovar, *Fendler* 1694, 1697; *Pittier* 12818.

Caracas, *Pittier* 5902; *Bailey* 148, 447. Los Teques, *Pittier* 6033; *Allart* 214.

BRAZIL: Caldas, *Henschen* III. 1345x. Est. Goyaz, *Glaziou* 22577; *Gardner* 4390. Southern Brazil, *Sello*.

4. *Paspalum cymbiforme* Fourn.

Paspalum cymbiforme Fourn. Mex. Pl. 2: 5. 1886.⁴¹ "Mirador, in campis (LIEBM. n. 224); San Pablo (LIEBM. n. 226); Consoquitla (LIEBM. n. 225)." Liebmann's no. 226 in the Copenhagen Herbarium, with the name in Fournier's script, is taken as the type. It is an overmature tuft of several culms.

DESCRIPTION

A slender perennial in small hard clumps; culms 0.5 to 1 meter tall, erect, with a few erect, leafy branches from the middle nodes, minutely pubescent below the panicle, otherwise glabrous; lower nodes sometimes bearded with erect hairs; sheaths puberulent on the collar and usually long-ciliate on the margin toward the summit, otherwise glabrous; ligule membranaceous, brown, about 1 mm. long, usually a row of stiff hairs back of it; blades usually spreading, 7 to 15 cm. long, 3 to 7 mm. wide (the uppermost often nearly setaceous), firm, tapering from the base to an involute-setaceous tip, obscurely puberulent on the upper surface, glabrous beneath, with a few long hairs at the base and sometimes scattered along the margin, racemes 2 or 3, flexuous or falcate, 5 to 7 cm. long, 1.5 to 3 cm. distant on a slender flexuous often narrowly winged axis; rachis 2 to 2.5 mm. wide, the wings brownish-membranaceous, the center dull green, a tuft of white hairs at the base, otherwise glabrous; spikelets in pairs, closely imbricate, 3 mm. long, about 1 mm.

⁴¹ The date given on the title-page of this work is 1886. A set of proof sheets was supplied to Bentham in 1880 and is referred to by the latter author in his paper, Notes on Gramineae, read November 3, 1881, and published in the Journal of the Linnaean Society (Botany 19: 14-134. 1881). Fournier's names are also cited by Hemsley (Biol. Centr. Amer. Bot. 3: 1885), to which work they are referred by the Index Kewensis, but the names are there usually nomina nuda. The proof sheets mentioned above are in the library at Kew, marked, "Proof sheets of Mr. Fournier Gramineae, 1881. From Mr. Bentham." They are stamped, "Ire Epreuve 18 Mai 1880." Bentham says of these (Notes on Gramineae, p. 20), "Eugène Fournier's 'Enumeration of Mexican Gramineae' is not yet published; but being already printed off and M. Fournier having obligingly supplied me with a copy, I feel bound in so far as I am concerned, to treat it as having already taken date." The Kew copy ends with page 150 and lacks index, title-page, and plates.—Taken from The North American Species of Panicum, Hitchcock and Chase, Contr. U. S. Nat. Herb. 15: 49. 1910. In addition it may be noted that Stiles in a discussion of "What constitutes publication" (Science 67: 471-478. 1928) holds that the distribution of proof sheets does not constitute publication, since publication necessarily implies public property.

wide, elliptic, acute, tawny or purplish-tinged, partly obscured by the long glistening white hairs; glume and sterile lemma equal, slightly inflated, obscurely 3 to 5 nerved, the glume pilose on the lower half and stiffly ciliate on the marginal nerves, the hairs conspicuously unequal, the longest 3 to 3.5 mm. long, the sterile lemma glabrous or sparsely pubescent at the summit, slightly sulcate down the middle toward the base; fruit about 2.2 mm. long and 0.7 mm. wide, elliptic, smooth.

DISTRIBUTION

Rocky slopes in the uplands, Mexico and Guatemala.

MEXICO: San Pablo, *Liebmann* 226.

VERA CRUZ: Mirador, *Liebmann* 224. Consoquitla, *Liebmann* 225.

GUATEMALA: Guatemala City, *Hitchcock* 9033½. Santa Rosa, *Heyde & Lux* (*Dist. Smith*) 4298.

5. *Paspalum humboldtianum* Flüge

Paspalus humboldtianus Flüge, Monogr. Pasp. 67, 1810. "America meridionalis. *Humboldt et Bonpland*." Kunth⁴² states that the specimen is from "regno Quitensi, prope Puembo," Ecuador. Specimens of this collection are in several herbaria. Those in the Museum of Natural History in Paris, in the British Museum, and in the United States National Herbarium bear the name in Bonpland's script, that in Berlin in Kunth's script. The specimens in the Willdenow Herbarium (2 sheets) are probably those described by Flüge. In all the specimens the blades are papillose-pubescent. The secondary spikelet of the pair is developed in part of some racemes but mostly abortive as described by Kunth for *P. ciliatum*.

Paspalum distichophyllum H. B. K. Nov. Gen. & Sp. 1: 86. 1816. "Mesa de Cuello et Ibague," Colombia, Humboldt and Bonpland. The type has not been located. The description indicates a late branching phase of *P. humboldtianum*, such a plant as Hitchcock's no. 9033, with reduced squarrose blades and but 2 or 3 racemes.

Paspalum ciliatum H. B. K. Nov. Gen. & Sp. 1: 87. pl. 24. 1816. Not *P. ciliatum* Lam. 1791. "Prope Ibague et Valle de Caravajal, in radicibus montis

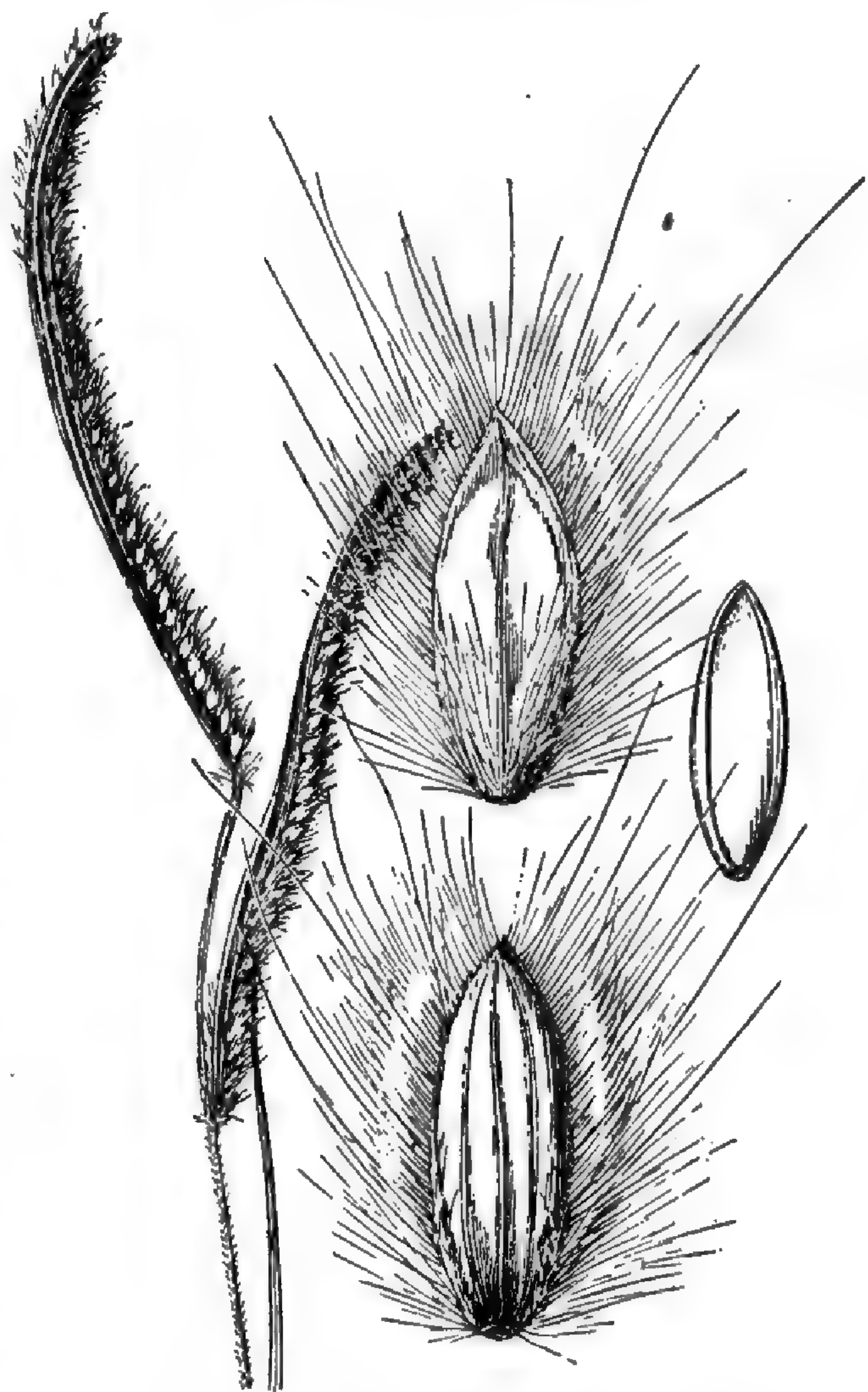


FIGURE 4.—*P. cymbiforme*. From type specimen

⁴²H. B. K. Nov. Gen. & Sp. 1: 86. 1816.

Quindiu, in regno Novogranatensi." [Colombia.] In the Berlin Herbarium is a specimen from the Humboldt Herbarium with the name in Kunth's script. No locality is given. A specimen from the Bonpland Herbarium with the name in Kunth's script but without locality is in the Paris Herbarium. A second in the Paris Herbarium from the Bonpland Herbarium but without Kunth's writing gives the locality as cited.

Paspalum blepharophorum Roem. & Schult. Syst. Veg. 2: 292. 1817. Based on *P. ciliatum* H. B. K. Trinius⁴³ misapplied this name to a common Brazilian species, *Paspalum polyphyllum* Nees, and the name has since been generally used for the species he figured.

Panicum obtectum Presl, Rel. Haenk. 1: 301. 1830. "Hab. in Mexico." The type specimen, collected by Haenke, in the National Museum at Prague consists of two specimens, each with but two racemes.

Tricholaena oblecta Fourn. Mex. Pl. 2: 35. 1886. Based on *Panicum obtectum* Presl. The name is earlier mentioned without citation of basis by Hemsley.⁴⁴

Panicum humboldtianum Kuntze, Rev. Gen. Pl. 3²: 361. 1898. Based on *Paspalum humboldtianum* Flügge.

In Index Kewensis *Paspalum ciliatum* Rupr. is listed. Ruprecht⁴⁵ refers Galeotti's no. 5683 to *P. ciliatum* H. B. K. (in its correct sense, with *P. blepharophorum* Roem. & Schult. as a synonym).

DESCRIPTION

A tufted perennial, erect or ascending from a woody decumbent base, and sometimes producing strong scaly rhizomes; culms 40 to 80 cm., rarely nearly 1 meter, tall, commonly branching from

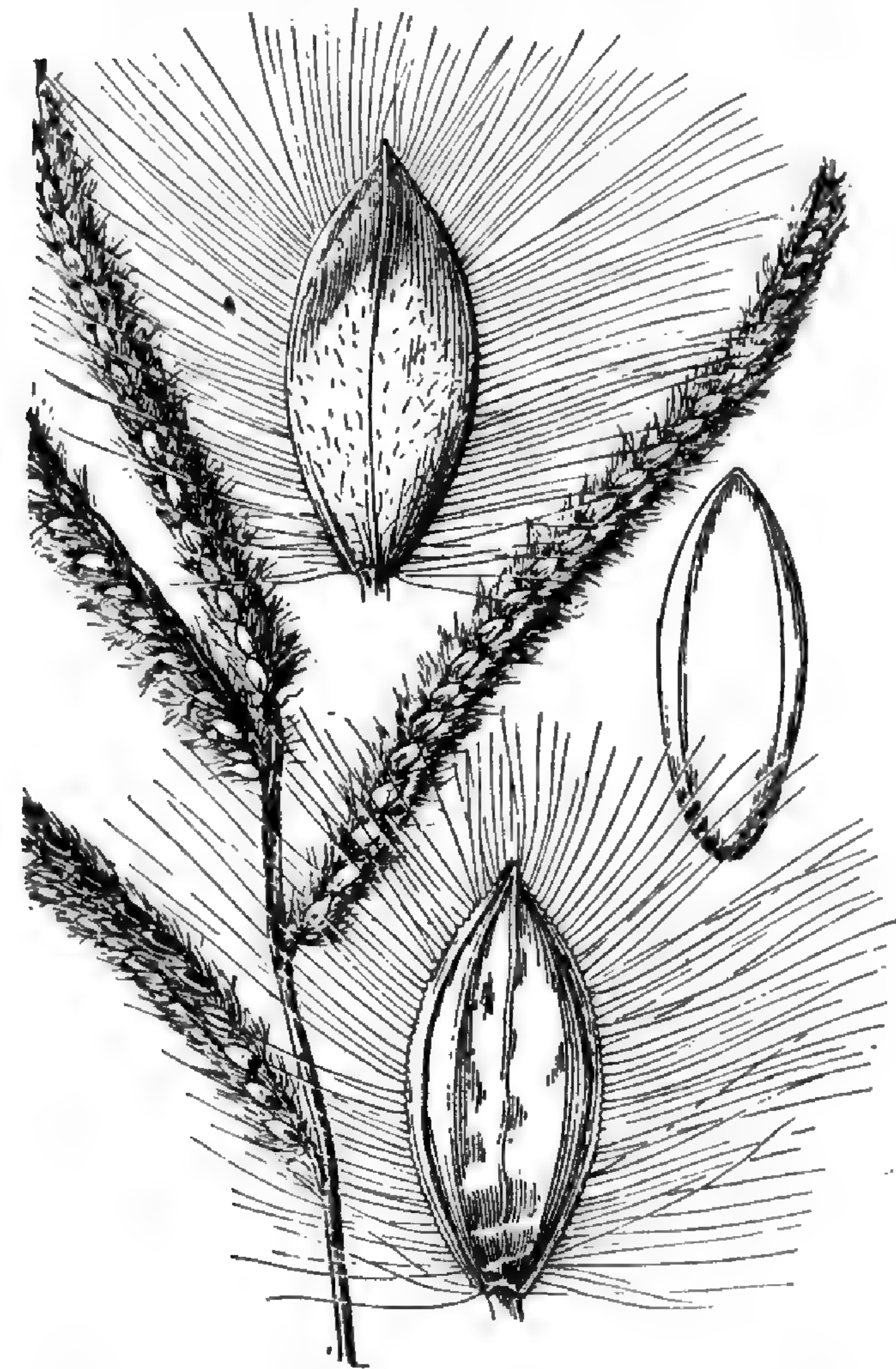


FIGURE 5.—*P. humboldtianum*. From type specimen and Pringle 1750

the lower and sometimes from the middle nodes; nodes from densely bearded with appressed white hairs to glabrate; sheaths mostly overlapping, papillose-pilose along the margin and usually toward the summit, sometimes throughout, rarely nearly glabrous; ligule membranaceous, brown, 1 to 2 mm. long; blades flat, firm, spreading, 8 to 18 cm. long, 6 to 15 mm. wide, slightly narrowed toward the base, acuminate into a stiff more or less involute point, the midnerve prominent beneath (the lower blades and those of the branches smaller, the uppermost reduced to a mere point) sparsely to rather densely pubescent to glabrate on the

⁴³ Gram. Icon 2: pl. 134. 1829.

⁴⁴ Biol. Centr. Amer. Bot. 3: 493. 1885.

⁴⁵ In Galeotti, Bull. Acad. Sci. Brux. 9: 238. 1842.

upper surface, the epidermis loosely cellular, a fringe of stiff white hairs back of the ligule, appressed-pubescent beneath with occasional long stiff hairs intermixed, the margins usually prominently papillose-ciliate; panicles consisting of 2 to 5 rarely 7 or 8, ascending to nodding, lax glistening silky racemes, 5 to 10 cm. long, about 7 mm. wide, 1 to 3 cm. distant on a slender flattened axis; rachis narrowly winged, 2 to 3 mm. wide, minutely scabrous or glabrous and with a tuft of long white hairs at the base; spikelets commonly solitary toward both ends of the raceme (the secondary spikelet undeveloped), in pairs in the middle, excluding the cilia about 3.2 mm. long, 1.1 mm. wide, elliptic, abruptly pointed; glume and sterile lemma equal, the glume 3-nerved, pubescent and edged with a fringe of glistening white hairs arising from papillae, at maturity becoming thick and corky, the hairs radiating like a corona, the lemma 3-nerved, strigulose or glabrous, papery and wrinkled toward the base; fruit about 2.8 mm. long, narrowly obovoid, smooth and shining.

In *P. humboldtianum* the amount of pubescence is exceedingly variable but otherwise the species is a well-marked one.

Arsène's no. 2813, Müller 2036, and Schaffner 136, all from Mexico, are peculiar teretological specimens with multiple glumes all fringed.

DISTRIBUTION

Stony open or brushy slopes in the highlands from Mexico to Argentina.

SONORA: Sierra de Álamos, *Rose, Standley & Russell* 12832.

SINALOA: Mazatlán, *Ortega* 4333.

COAHUILA: Jaral, *Schumann* 1737.

SAN LUIS POTOSÍ: San Luis Potosí, *Schaffner* 173. Cárdenas, *Hitchcock* 5723, 5776.

JALISCO: Guadalajara, *Hitchcock* 7297; *Palmer* 286 in 1886; *Pringle* 1750, 11757. Zapotlán, *Hitchcock* 7176.

COLIMA: Alzada, *Hitchcock* 7055.

MICHOACÁN: Uruápan, *Hitchcock* 6980. Morelia, *Arsène* 2471, 2813, 5849, 6665.

PUEBLA: Mt. Orizaba, *Seaton* 117.

VERA CRUZ: Orizaba, *Bourgeau* 2641; *Hitchcock* 6355; *Müller* 2036, 2037; *Schaffner* 136. Mirador, *Liebmann* 221. Jalapa, *Hitchcock* 6679. Zacuapan, *Purpus* 2002, 2901, 6207, 8029.

MORELOS: Cuernavaca, *Hitchcock* 6837; *Holway*⁴⁶ 3510; *Rose, Painter & Rose* 10203.

OAXACA: Sierra de San Felipe, *Conzatti & Gonzalez* 440; *Pringle* 5572. Oaxaca, *Hitchcock* 6133. Xochimilco, *Conzatti* 3641.

GUATEMALA: Cobán, *Türkheim* 3790. Alta Verapaz, *Pittier* 219. Dept. Santa Rosa, *Heyde & Lux* (*Dist. Smith*) 6271. San Rafael, *Holway* 64. Solala, *Holway* 129. Guatemala City, *Hitchcock* 9033. Cuyotenango, *Rojas* 105. Without locality, *Tonduz* 750; *Seler* 2442.

HONDURAS: Siguatepeque, *Standley* 56246.

EL SALVADOR: San Salvador, *Calderón* 1152; *Hitchcock* 8895. Finca San Nicolás, *Choussy* A18.

NICARAGUA: Jinotepe, *Hitchcock* 8697.

COSTA RICA: Nuestro Ami, *Jiménez* 529. San Rafael de Cartago, *Pittier* 9734.

PANAMA: El Boquete, *Hitchcock* 8186; *Killip* 4522.

⁴⁶ In Mexican Grasses, *Contr. U. S. Nat. Herb.* 17: 230–240, 1913, *Holway's* collections made in 1899 were cited as *Rose's*, the labels, by a clerical error, giving *Rose* as collector.

COLOMBIA: Huila, *Pittier* 1530. Loma de Bichiquí, *Pittier* 1525. Pamplona, *Killip & Smith* 19770.

VENEZUELA: Tovar, *Pittier* 12820. Caracas, *Pittier* 6155, 7216, 7354, 9559, 9626. Galipán, *Pittier* 6202. Quebreda de Anauco, *Eggers* 13330. Without locality, *Fendler* 1699.

ECUADOR: Quito, *Harteman* 65. Ambato, *Hitchcock* 21710. Huigra, *Rose* 22639. Between Huigra and Naranjapata, *Hitchcock* 20656. Portovelo, *Hitchcock* 21306; *Rose* 24027. Pichincha, *Firmin* 255, 562.

PERU: Chosica, *Holway* 782; *Macbride & Featherstone* 517. Ollantaytambo, *Hitchcock* 22485. "Huara" (probably Huaraz) *Dombey*.

BOLIVIA: Sorata, *Rusby* 205; *Mandon* 1254. Cotaña, *Buchtien* 3125. Illimani, *Julio* 44. Cochabamba, *Hitchcock* 22795, 22830. Buena Vista, *Steinbach* 6644. Río Cuchi, *Steinbach* 6618. Without locality, *Bang* 2590.

ARGENTINA: Prov. Tucumán, *Lillo* 4284. Prov. Catamarca, *Jørgensen* 1765. Sierra Chica de Córdoba, *Stuckert* 1875. Without locality, *Lorentz & Hieronymus* 184.

6. *Paspalum pectinatum* Nees

Paspalum pectinatum Nees in Trin. Gram. Icon. 1: pl. 117. 1828. The illustration is said to be from "specimen Brasiliense." Nees, who publishes the species anew,⁴⁷ cites a specimen in the Berlin Herbarium collected by Sello in southern Brazil. The type specimen in the Trinius Herbarium is labeled "Sellow, Brazil." Both descriptions are doubtless based on the same collection.

Anastrophus pectinatus Schlecht.; Jacks. Ind. Kew. 1: 118. 1893. Listed under *Anastrophus* with reference to Schlechtendal's paper on *Anastrophus*.⁴⁸ Schlechtendal mentions *Paspalum pectinatum* Nees as very different from other species of the group, but does not make the combination.

DESCRIPTION

An erect perennial in coarse tufts, hard, smooth and reddish at the base, resembling *Fimbristylis spadicea*; culms simple, 0.3 to 1 meter tall, subcompressed, rather rigid, glabrous; lower sheaths overlapping, firm, with a thinner margin, often shredded, glabrous below, harshly villous toward the summit, often loose from the culm, ferruginous on the inside; ligule firm, about 1 mm. long, blades suberect, rather thick, 12 to 60 cm. long, 3 to 5 mm. wide, the uppermost usually reduced or obsolete, linear, densely harshly villous, sometimes becoming glabrate in age; racemes 1 to 3, usually 2, conjugate or closely approximate, suberect or ascending, often appressed to each other, 4 to 8 cm. long, about 5 mm. wide (or wider when flattened out), commonly dwindling and with abortive spikelets at the summit; rachis 1.8 to 2.3 mm. wide, dull, clothed with long hairs at the very base, otherwise glabrous, the margins slightly erose, scabrous; spikelets solitary, closely imbricate, 4.5 to 6 mm. long, about 2.5 mm. wide excluding the cilia, depressed, cordate-lanceolate; glume and sterile lemma 3-nerved, the glume nearly flat, the margins outspread, minutely ciliate, pubescent at base, otherwise glabrous; the sterile lemma narrower and shorter than the glume, sparsely clothed with stiff hairs (their bases tuberculate at maturity) on the thin internerves, ciliate on the thickened brown tuberculate margin, the stiff spreading hairs 2 to 3 mm. long; fruit 4.2 to 4.5 mm. long, about 1.7 mm. wide, lanceolate-elliptic, obtuse, the lemma and palea rather thin in texture, brownish, the lemma ascendingly ciliate along the angles and at the summit.

⁴⁷ Agrost. Bras. 34. 1829.

⁴⁸ Bot. Zeit. 8: 681. 1850.

Trinius figures a minute first glume and states that it is found on most of the spikelets. Nees does not mention such a glume and none is found in the specimens (including a fragment from Trinius' type) examined.

DISTRIBUTION

Savannas and rocky open slopes from sea level to 1,800 meters, Honduras to southern Brazil.

HONDURAS: Dept. Copán, *Blake* 7445.

COSTA RICA: Cruz de Guanacaste, *Pittier* 2695. Puntarenas, *Biolley* 2651.

PANAMA: Cerro Vaca, *Pittier* 4351. Taboga Island, *Hitchcock* 8096; *Pittier* 3584.

COLOMBIA: Popayán, *Lehmann* 979.

BRAZIL: Serro do Cipó, *Chase* 9212, 9216, 9250. Caldas, *Regnell* in 1845. Est. Minas Geraes, *Kuhlmann* 5998; *Widgren* 885. Serra do Urbano, *Glaziov* 22426. Campo de Pichoa, *Glaziov* 22427. Est. Goyaz, *Glaziov* 22429. Campinas, *Novaes* 1272. Itapetininga, *Löfgren* 267. Jaguariahyva, *Dusén* 10611, 13256. Turma, *Dusén* 15727. Ponta Grossa, *Dusén* 2844a. Est. Paraná, *Dusén* 2770.

7. *Paspalum contractum* Pilger

Paspalum contractum Pilger, Bot. Jahrb. Engler 25: 709. 1898. "Columbia: Collecta in itinere ad Los Llanos de San Martin (Coll. columb. n. 190. *Stübel*)."

The type in the Berlin Herbarium, bearing the name in Pilger's script, is a poor specimen without the base and the blades fallen.

Paspalum echinotrichum Mez, Bot. Jahrb. Engler 56: Beibl. 125: 9. 1921. "Hylaea [Brazil] (*Ule* br. n. 29 et n. 8033, 8479)." The three specimens with the name in Mez's script are in the Berlin Herbarium. The spikelets are mostly fallen from no. 29; no. 8033, being an excellent complete specimen, is taken as the type.

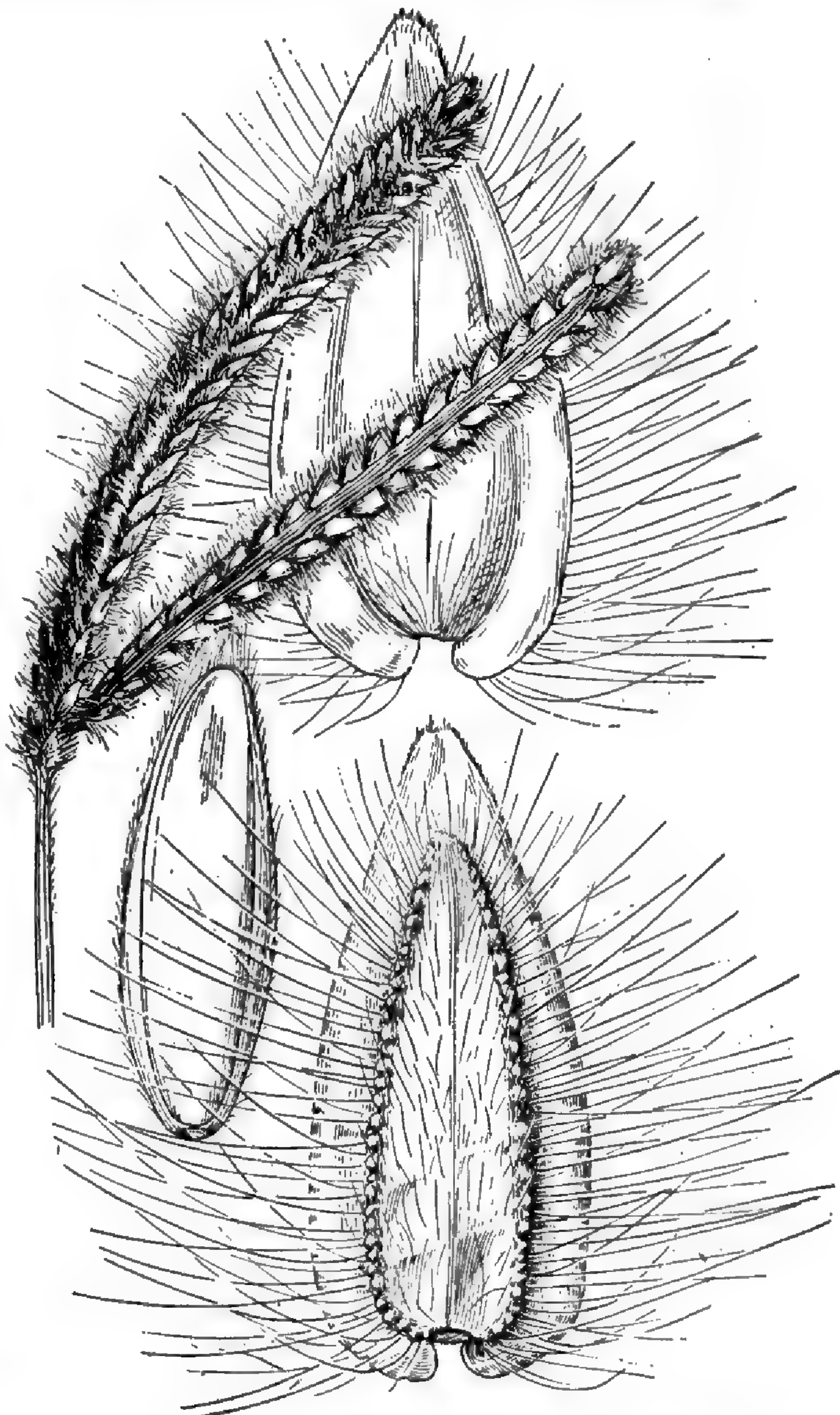


FIGURE 6.—*P. pectinatum*. From type specimen and *Pittier* 2651

DESCRIPTION

A slender tufted perennial; culms 50 to 90 cm. tall, erect, simple, glabrous, the lower and middle nodes with a band of erect white hairs; leaves aggregate on the lower half of the culms, the upper two sheaths distant, nearly bladeless, glabrous, the lower and middle sheaths long-pilose, the lowermost glabrate

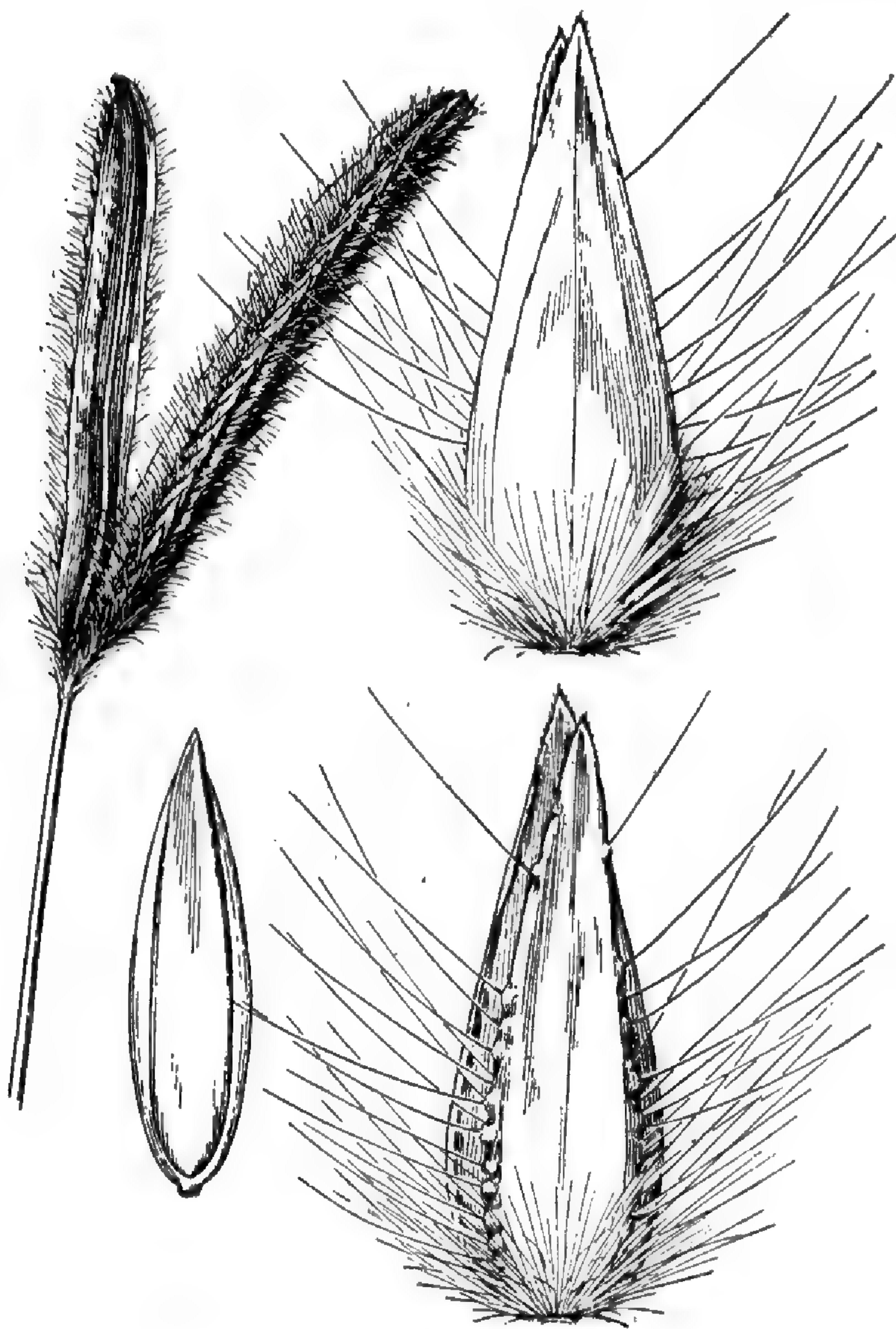


FIGURE 7.—*P. contractum*. From Pittier 5063

and somewhat shredded toward the base; ligule about 1 mm. long, firm, brown, with a ring of long white hairs back of it; blades suberect, 10 to 25 cm. long, 2 to 4 mm. wide (the upper much reduced), linear, both surfaces conspicuously pilose, the spreading hairs about 5 mm. long and, beneath the copious long hairs, densely short-pubescent, the margin and midnerve beneath strongly papillose; racemes 2 or 3, closely approximate, narrowly ascending, 3.5 to 7 cm. long, 5 to 6 mm. wide; rachis 4.5 to 5 mm. wide, clothed with long hairs at the very base, otherwise glabrous, the center pale green, the membranaceous wings light golden-brown, fading to tawny; spikelets solitary, closely imbricate, 5 to 5.5 mm. long, about 1.8 mm. wide

excluding the cilia, depressed, lanceolate, acuminate; glume and sterile lemma faintly 3-nerved, the glume slightly convex, the margins upturned, except toward the summit, but not clasping the sterile lemma, densely bearded at the base, otherwise glabrous, minutely fimbriate-ciliate at the summit; sterile lemma narrower and slightly shorter than the glume, pilose at the base and stiffly ciliate on the thickened papillose margin except at the summit, the spreading hairs 2 to 2.5 mm. long, densely pilose at the base, ciliolate at the summit, and sometimes with a few stiff tubercle-based hairs on the internerves; fruit 3.8 mm. long, 1.8 mm. wide, pale, glabrous, minutely stipitate, the palea slightly exceeding the lemma.

DISTRIBUTION

Open slopes, between 500 and 1,000 meters, Panama to northern Brazil.

PANAMA: Picacho de Olá, Pittier 5063.

COLOMBIA: Llanos de San Martín, Shaw in 1927; Stübel 190 (Berlin Herb.).

BRITISH GUIANA: Mount Roraima, Im Thurn 262; Tate 157, 296 A.

BRAZIL: Hylaea, Ule 29, 8033, 8479 (all in Berlin Herb.).

8. *Paspalum sanguineolentum* Trin.

Paspalum sanguineolentum Trin. Gram. Pan. 116. 1826. "Brasil. (Langsdorff.)" The type in the Trinius Herbarium was examined by A. S. Hitchcock. It is labeled "In graminosis subhumidis, S. da Lapa, Brasil, Langsdorff." This is the original of the illustration in the Icones.⁴⁹

DESCRIPTION

A slender erect olivaceous tufted perennial; culms 1 to 1.25 meters tall, simple, compressed, sometimes loosely twisted, glabrous; nodes appressed-bearded to nearly or the upper quite glabrous; leaves aggregate near the base, sometimes reddish tinged (hence the name), the lower sheaths short, overlapping and appressed-pubescent, the pubescence dense and tawny at base, the upper elongate, bladeless or with reduced blades, sparsely pubescent to glabrous; ligule membranaceous, firm, about 1 mm. long; blades flat, ascending or spreading, 5 to 30 cm. long, 8 to 15 mm. wide, the lower tapering to the base, those of the mid-culm rounded at base, from appressed-pubescent on both surfaces to glabrous, usually with long hairs at the very base on the upper surface; panicles nodding, of 3 to 8 ascending pale silky racemes 3 to 7 cm. long, approximate or the lower somewhat distant on a slender flattened axis; rachis 0.8 to 1.2 mm. wide, long-pilose at the very base, the margin scabrous; spikelets in pairs on minute scabrous pedicels, scarcely crowded, 3.3 to 3.5 mm. long, about 1.5 mm. wide, rather turgid; glume and sterile lemma 3-nerved, the glume slightly shorter than the fruit, both pale silky-villous, the hairs arising from papillae and much exceeding the spikelet; fruit nearly as large as the spikelet, pale, smooth and shining.

The Mexican specimens cited below were referred to *Paspalum erianthum* Nees by Nash⁵⁰ and by Chase⁵¹. That species, closely allied to *P. sanguineolentum*, is much more common in Brazil but has not been found in North America. The Eriantha group does not belong in subgenus *Ceresia*, *P. sanguineolentum* being placed here for convenience.

DISTRIBUTION

Moist savannas, southern Mexico and Brazil.

OAXACA: San Juan Guichicovi, Nelson 2735, 2735a.

BRAZIL: Goyaz, Gardner 3542; Glaziou 22489 in part. Est. Rio Grande do Sul, Dutra 546 (depauperate). Without locality, Sello 3541.

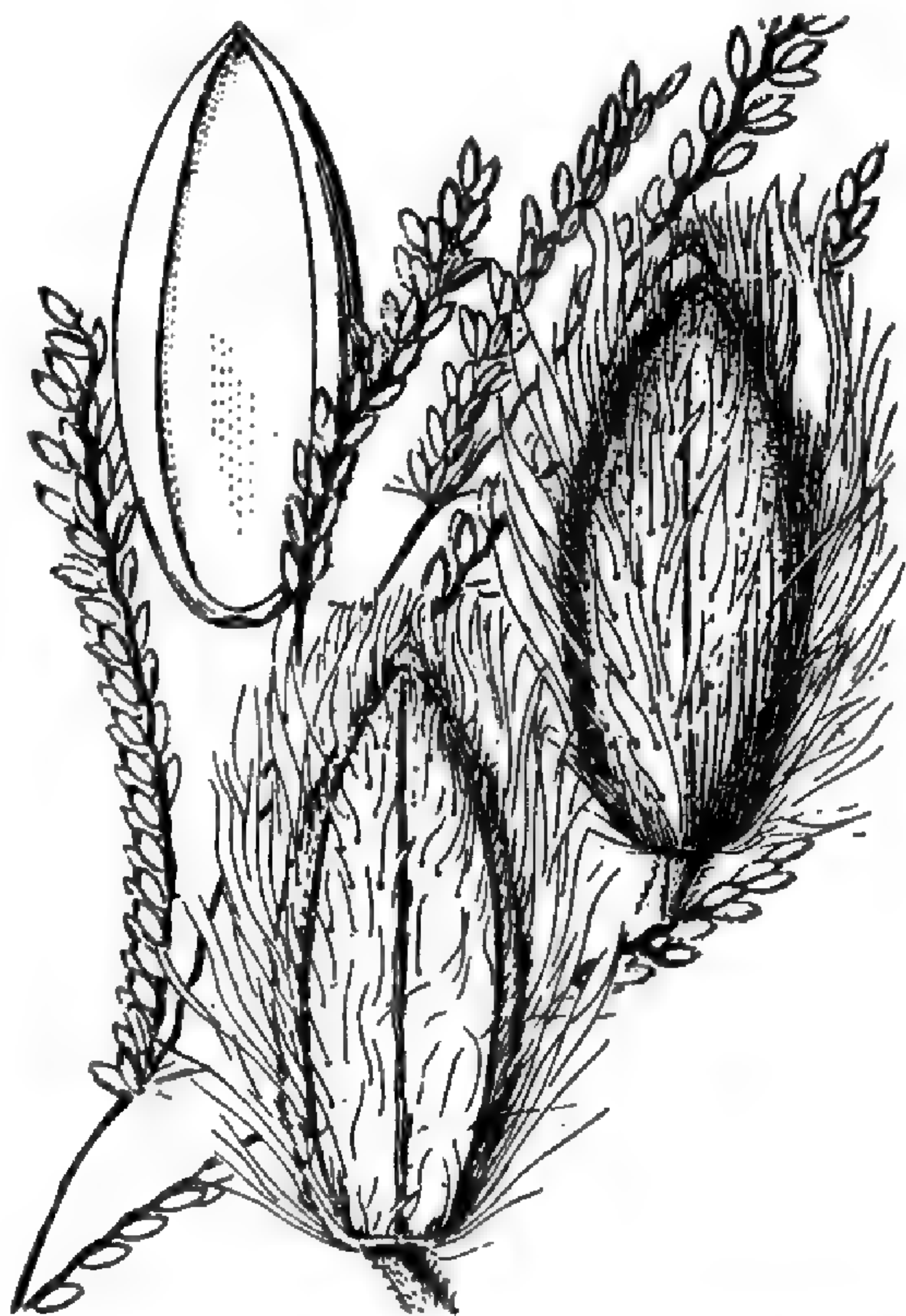


FIGURE 8.—*P. sanguineolentum*. From Nelson 2735

⁴⁹ Trin. Gram. Icon. 2: pl. 142. 1829.

⁵⁰ N. Amer. Fl. 17: 196. 1912.

⁵¹ Contr. U. S. Nat. Herb. 17: 240. 1913.

PASPALUM PROPER

Dissecta. (Subsect. *Pseudoceresia* Benth. & Hook.)⁵²—Annuals or perennials, mostly branching and straggling (*P. crassum* robust, erect); blades flat; racemes few to many; rachis foliaceous, green; spikelets glabrous (or minutely pubescent in *P. repens*); fruit pale. Mostly aquatics, subaquatics, or plants of ditch borders and moist places.

Plants perennial.

Racemes persistent on the axis; rachis with a spikelet at the apex. Second glume developed.

Spikelets 2 mm. long, obovate-oval.....9. *P. dissectum*.

Spikelets more than 3 mm. long, pointed.

Racemes 2 (rarely 1); blades mostly not more than 5 mm. wide.

10. *P. serratum*.

Racemes mostly 3 to 5 (rarely 2); blades mostly more than 8 mm. wide.

11. *P. acuminatum*.

Racemes falling from the axis; rachis extending beyond the uppermost spikelet.

Spikelets about 0.8 mm. wide, in two rows.....12. *P. repens*.

Spikelets about 1.2 mm. wide, so distant as to appear as if in a single row.

13. *P. longicuspe*.

Plants annual.

Plants robust, erect; racemes 5 to 15 cm. long, persistent..18. *P. crassum*.

Plants slender, spreading or clambering; racemes 1.5 to 5 cm. long, falling entire.

Second glume developed.

Racemes 20 to 80 or more; sterile lemma distinctly fluted, the glume slightly so.....17. *P. racemosum*.

Racemes 3 to 12; sterile lemma not fluted.....14. *P. prostratum*.

Second as well as first glume suppressed.

Plants smooth or slightly scabrous; spikelets 2.3 to 2.5 mm. long.

15. *P. candidum*.

Plants very scabrous throughout; spikelets 1.8 to 1.9 mm. long.

16. *P. scabrum*.

9. *Paspalum dissectum* (L.) L.

Panicum dissectum L. Sp. Pl. 57. 1753. Following a brief description are three citations, from Royen, Plukenet, and Sloane, and the locality, "Habitat in Indiis." None of the citations agree with Linnaeus' own description. In the Linnaean Herbarium is a specimen collected by Kalm in North America which bears the name in Linnaeus' script. No locality is given, but the plant was probably collected in Delaware. "Dactylis spicis alternis numerosis patulis, calycibus unifloris. Roy. lugdb. 56," and Plukenet's name (see p. 6) we are unable to identify. The Sloane citation applies to *Paspalum virgatum* and was later cited by Linnaeus when he described that species. The locality "in Indiis" may have been intended for Sloane's Jamaican species. Linnaeus' description "spiculis alternis; rachi lineari membranacea extrorsum imbricato florifera" so perfectly applies to the winged rachis turned up over the base of the spikelets in the Kalm specimen that that is taken as the type, the citations being rejected as erroneous.⁵³

⁵² Gen. Pl. 3: 1098. 1883.

⁵³ For full discussion see Hitchcock, Types of American Grasses, Contr. U. S. Nat. Herb. 12: 115. 1908.

Paspalum dimidiatum L. Syst. Nat. ed. 10. 2: 855. 1759. Based on "*Panicum dissectum* sp. pl. 57. n. 6" [6 being *P. dissectum*].

Paspalum dissectum L. Sp. Pl. ed. 2. 81. 1762. Based on "*Panicum dissectum* Sp. pl. 1. p. 57."

Paspalum membranaceum Walt. Fl. Carol. 75. 1788. Presumably described from South Carolina. No specimen of this genus is found in Walter's herbarium.⁵⁴ Of the species found in Walter's locality, his brief description applies only to *P. dissectum*.

Paspalum vaginatum Ell. Bot. S. C. & Ga. 1: 109. 1816. Not *P. vaginatum* Swartz, 1788. "Near Savannah—Doctor Baldwin." The type specimen in the Elliott Herbarium has been examined.

Paspalum walterianum Schult. Mant. 2: 166. 1824. Based on "*Paspalum membranaceum* Walt.," the name presumably changed because of the later *P. membranaceum* Lam. In Chapman's Flora⁵⁵ the name is given as *P. walteri* Schultes.

Paspalum tectum Steud. Syn. Pl. Glum. 1: 29. 1854. "Florida." The type, bearing the name in Steudel's script in the Paris Herbarium, consists of a single culm. It was collected by Chapman.

Paspalum drummondii C. Muell. Bot. Zeit. 19: 332. 1861. "America septentrionalis, ubi prope St. Louis legit Drummond (Coll. 1. No. 182)." The type specimen was examined in the Berlin Herbarium.

DESCRIPTION

A subaquatic, glabrous, olive-green perennial, creeping, often forming radiate mats, rooting at the nodes, freely branching, the flowering branches ascending; culms 20 to 60 cm. long, compressed, the nodes usually swollen; sheaths soft, loose, commonly divergent, often flat and bladelike, the prophyllum visible; ligule about 2 mm. long, hyaline, lacerate, extending down the sheath margin; blades flat, thin, usually spreading, 3 to 6 cm. long, rarely longer, 4 to 5 mm. wide, scarcely narrowed at base, rather abruptly acute; inflorescence terminal and axillary, short-exserted, of 2 to 4 usually erect racemes, distant half to one-third their own length, on a slender, narrowly winged axis; racemes falling entire; usually 2 to 3 cm. long, the rachis membranaceous, 2 to 3 mm. wide, abruptly pointed and terminating at the base of the uppermost spikelet, the minutely scabrous margins inflexed, covering the base of the spikelets; spikelets solitary, 2 mm. long, 1.4 mm. wide, obovate, subacute, pale; glume and sterile lemma thin, 3 to 5 nerved, slightly exceeding the fruit, in the terminal spikelet usually a little longer, forming a short point; fruit 1.8 mm. long, 1.3 mm. wide, obtuse, minutely papillose-roughened.

DISTRIBUTION

On muddy or sandy banks of ponds and ditches or in shallow water, New Jersey and Missouri to Florida and Texas; also in Cuba.

NEW JERSEY: West Cape May, *Brown* in 1921.

ILLINOIS: Duquoin, *Eggert* in 1893.

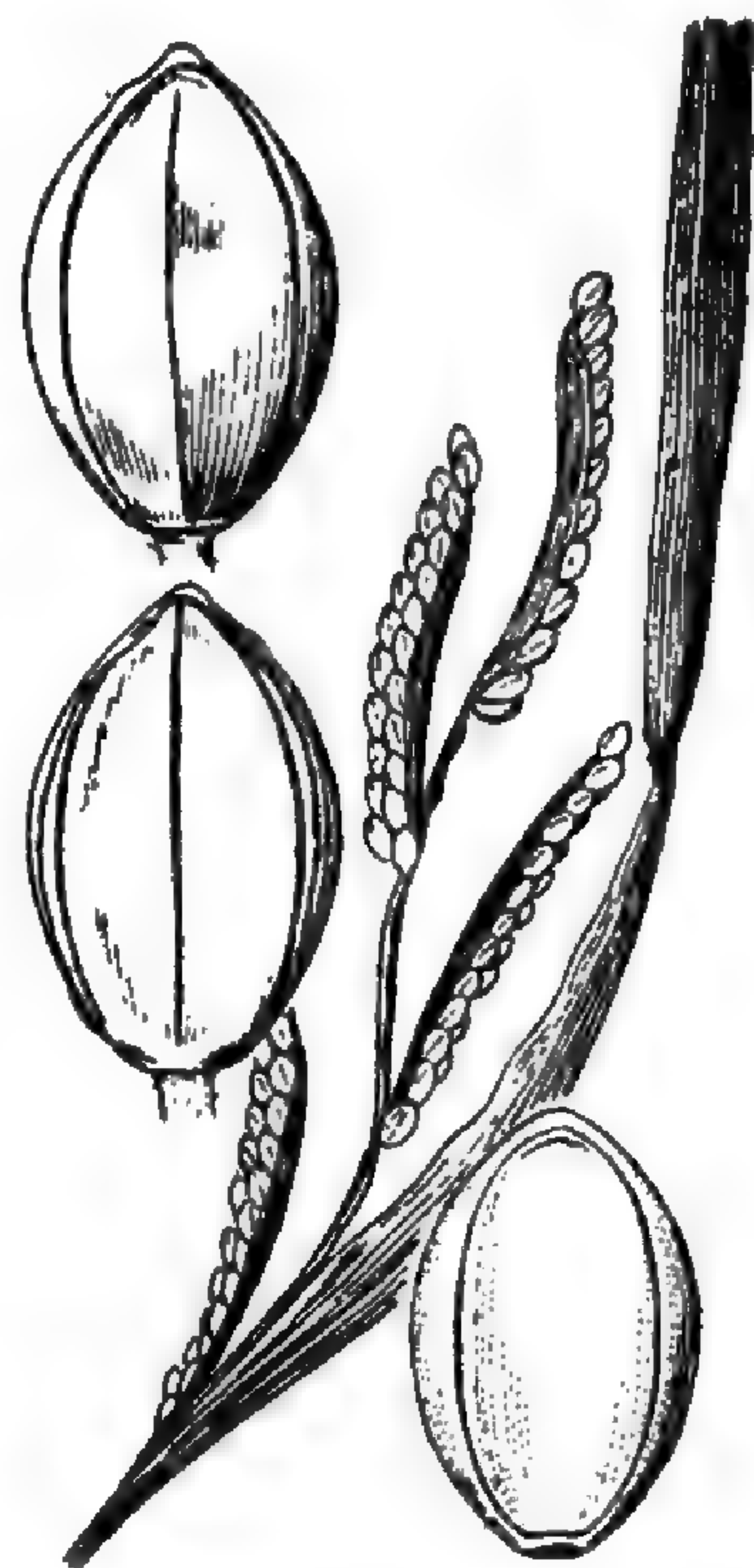


FIGURE 9.—*P. dissectum*. From Commons 85

⁵⁴ See Hitchcock, Identification of Walter's Grasses, Ann. Rep. Mo. Bot. Gard. 16: 31-56. 1905.

⁵⁵ Fl. South. U. S. 570. 1860

MISSOURI: Webb City, *Palmer* 968, 969.

DELAWARE: Ellendale, *Canby* in 1891. Townsend, *Canby* in 1863 and in 1896; *Commons* in 1863. Wilmington, *Commons* 85. Cedar Neck, *Commons* 314.

MARYLAND: Berlin, *Canby*. Without locality, *Canby*.

GEORGIA: Savannah, *Baldwin*.

FLORIDA: Jacksonville, *Curtiss* 5081 in part; *Kearney* 170. Monticello, *Combs* 351. Milton, *Chase* 4313. Apalachicola, *Chapman* (*Dist. Biltmore*) 4307a. Econfinia, *Combs* 679. Chipley, *Combs* 578. Pensacola, *Combs* 527. Waldo,

Combs 689. Ellzey, *Combs* 833. Avondale, *Combs* 501. Without locality, *Curtiss* in 1886; *Chapman*.

TENNESSEE: Nashville, *Gattinger* in 1878, 1879, and 1882; *Gattinger* in *Curtiss* 3564.

ALABAMA: Mobile, *Kearney* 40; *Mohr* in 1884 and 1892.

MISSISSIPPI: Scranton, *Tracy* 4507. Ocean Springs, *Tracy* 128.

ARKANSAS: Fulton, *Bush* 1055.

LOUISIANA: Shreveport, *Cocks* 3512. Alexandria, *Hale*. Crowley, *Webb* in 1912. Oberlin, *Ball* 221. Without locality, *Buckley*; *Drummond*.

TEXAS: Houston, *Thurrow* in 1898. Without locality, *Drummond* 363; *Nealley* in 1886.

CUBA: Laguna Santa Maria, *Ekman* 17269. Hanábana, *Wright* 169 in 1865. Eastern Cuba, *Wright* 3440.

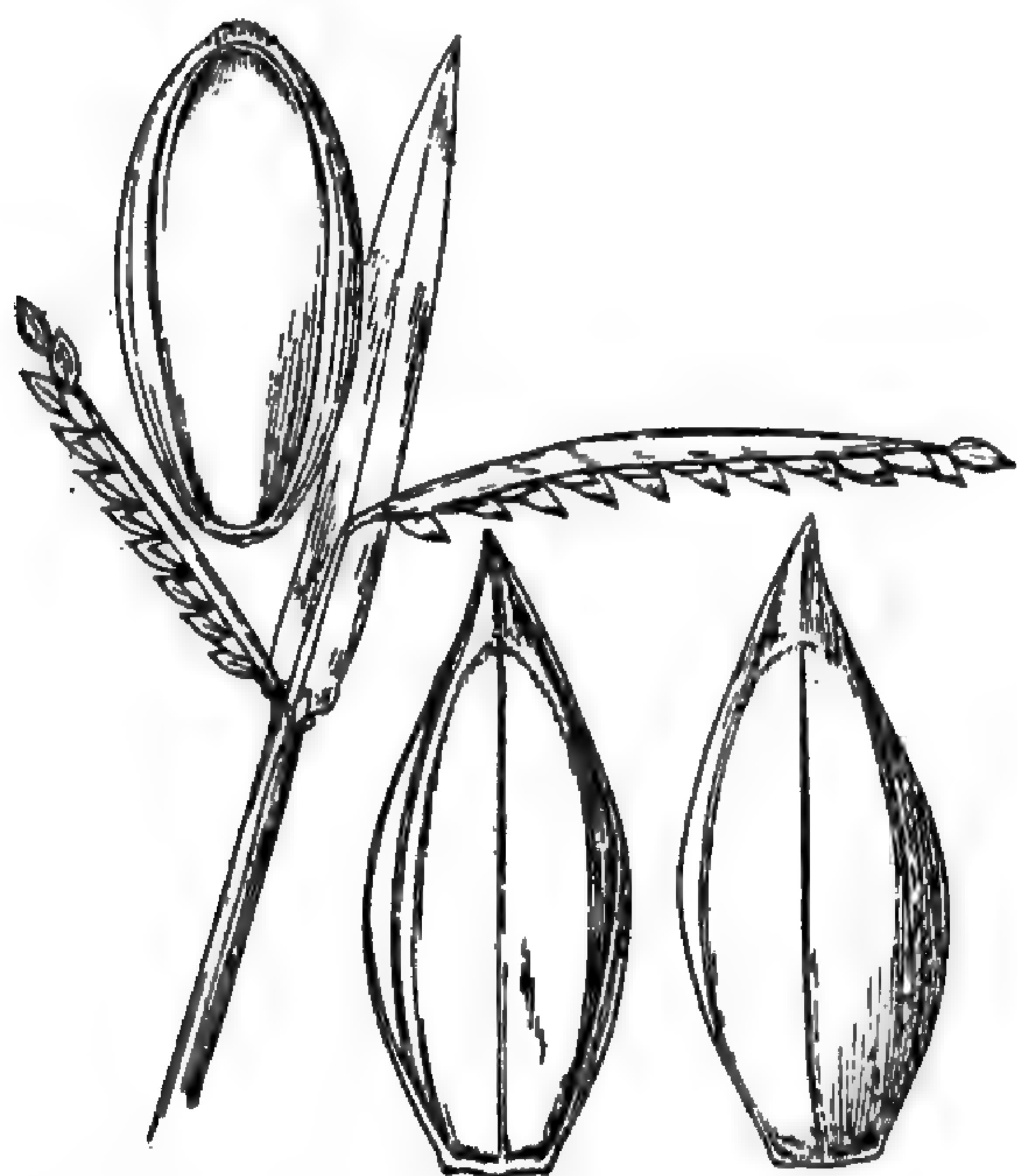


FIGURE 10.—*P. serratum*. From type specimen

10. *Paspalum serratum* Hitchc. & Chase

Paspalum serratum Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 306. 1917. "Type in the U. S. National Herbarium, no. 694431, collected in the water of a small pool, Troy, Jamaica, November 6, 1912, by A. S. Hitchcock (no. 9795)."

DESCRIPTION

An aquatic, glabrous perennial with rather soft elongate sparingly branching culms as much as 1.7 meters long, bearing a few rootlets at the nodes, the internodes flattened, more or less angled in drying; sheaths thin, loose, overlapping on the flowering branches; ligule 2 mm. long, hyaline, erose; blades flat, soft, thin, ascending, 3.5 to 9 cm. long, 3 to 7 mm. wide, abruptly rounded at base; racemes 2, rarely 1, 12 to 15 mm. distant, spreading, 3 to 5 cm. long, the peduncle mostly included; rachis membranaceous, green, 3 to 3.5 mm. wide, the margins inflexed over the base of the spikelets, naked at the base, terminating at the base of the uppermost spikelet; spikelets solitary, 3.2 to 3.4 mm. long, 1.4 mm. wide, elliptic, acute, the thin faintly 3-nerved glume and sterile lemma pointed beyond the fruit; fruit elliptic-obovate, obscurely papillose-roughened, the very tip bearing a few minute, thick hairs.

Paspalum serratum differs from *P. dissectum* in its sparingly branching habit, less leafy culms, and larger pointed spikelets.

DISTRIBUTION

In ponds and sluggish streams, Cuba and Jamaica.

CUBA: Jagüey Chico, *Ekman* 16990.

JAMAICA: Troy, *Hitchcock* 9795; *Harris* 12582, 12598. Inverness, *Harris* 12719. Without locality, *Alexander*.

11. *Paspalum acuminatum* Raddi

Paspalum acuminatum Raddi, Agrost. Bras. 25. 1823. "In pratis prope Rio-janeiro." The type specimen in the Raddi Herbarium at the University in Pisa consists of two culms, each with 3 racemes.

DESCRIPTION

An aquatic or subaquatic glabrous perennial with an extensively creeping base, or, in wet ground, in clumps of few to several culms decumbent at base, and erect or ascending, sparingly branching flowering culms 30 to 100 cm. long; culms rather fleshy, compressed, the nodes dark brown; sheaths soft, loose, overlapping toward the summit of the culms; ligule hyaline, 2 mm. long, slightly erose; blades flat, soft, ascending, 4 to 12 cm. long, 5 to 12 mm. wide, rounded at base, abruptly acuminate, racemes 3 to 5, rarely 2, distant about one-fourth their length along a narrowly winged axis, erect or ascending, 3.5 to 7 cm. long; rachis membranaceous, 3 to 3.5 mm. wide, the margins inflexed over the base of the spikelets, minutely hispidulous, terminating at the base of the uppermost spikelet; spikelets solitary in two rows, 3.5 mm. long, 1.6 mm. wide, elliptic, the thin glume and sterile lemma abruptly pointed beyond the fruit, faintly 3 to 5 nerved; fruit 2.9 mm. long, 1.5 mm. wide, obovate-elliptic, minutely papillose-roughened, the obtuse apex with a minute tuft of short thick hairs.

DISTRIBUTION

In shallow water or wet open ground, from southern Louisiana and Texas to Argentina.

LOUISIANA: Without locality, *Buckley* (mixed with *P. dissectum*).

TEXAS: Falfurrias, *Tharp* 3225.

MICHOACÁN: Morelia, *Arsène* 3132.

GUATEMALA: Without locality, *Bernoulli & Cairo* 938.

BRAZIL: São Miguel, Minas Geraes, *Chase* 9622.

PARAGUAY: Sierra de Amambay, *Hassler* 10784.⁵ Río Apa, *Hassler* 11930.

Lacus Ypacaray, *Hassler* 12471.

ARGENTINA: Mercedes, *Parodi* 6213.

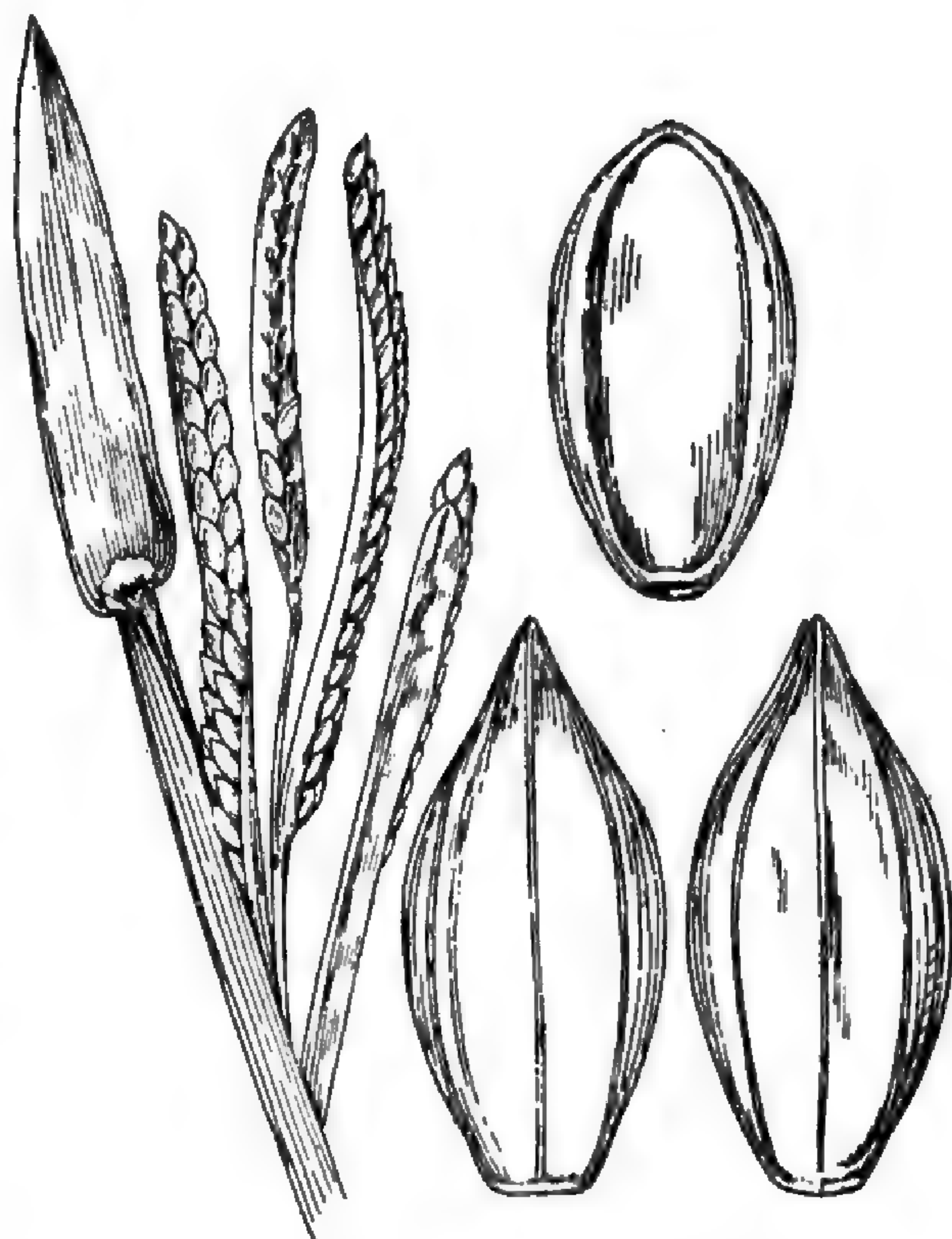


FIGURE 11.—*P. acuminatum*. From *Arsène* 3132

12. *Paspalum repens* Bergius

Paspalum repens Bergius, Act. Helv. Phys. Math. 7: 129. pl. 7. 1762. 'Habitat in Surinamo.' [Dutch Guiana.] The type specimen has not been located but Bergius' detailed description, especially the statement that the mouth of the sheath is bidentate, referring to the prominent auricles characteristic of this species, and the plate, leave no doubt as to its identity. The spikelets are not said to be pubescent so it is to be assumed those of Bergius' specimen are glabrous.

⁵ Some of the collections of this series were made by Rojas, but the numbers are those of Hassler.

Paspalum gracile Rudge, Pl. Guian. 20. pl. 26. 1805. No locality is given. The type specimen in the herbarium of the British Museum is labeled "Guiana." It consists of a part of a culm with inflated sheaths and a partly included panicle 10 cm. long. The spikelets are minutely pubescent.

Paspalum mucronatum Muhl. Cat. Pl. 8. 1813. Name only, the one word "sharp-pointed" given in the column of English names being merely a translation of the name "*mucronatum*." The habitat listed is Georgia.

Ceresia fluitans Ell. Bot. S. C. & Ga. 1: 109. pl. 6. f. 4. 1816. "Grows in the river swamps. Ogechee. In rice fields." The type specimen is in the Elliott Herbarium; the spikelets are sparsely pubescent.

Paspalum mucronatum Muhl. Descr. Gram. 96. 1817. "Habitat ad ripas Mississippi, et in Georgia." The type is in the Muhlenberg Herbarium; the spikelets are sparsely pubescent.

Paspalum natans LeConte, Journ. de Phys. 91: 285. 1820. "*P. mucronatum* Muhlenberg. Habitat in Georgiae oryzaceis." There is no specimen in the herbarium of the Academy of Natural Sciences, Philadelphia,⁵⁷ bearing this name in LeConte's handwriting. There is a specimen of *P. repens* labeled "*Paspalum fluitans*" in his hand. The description and the citation of *P. mucronatum* Muhl. leave no doubt as to the species.

Paspalum fluitans Kunth, Rév. Gram. 1: 24. 1829. Based on *Ceresia fluitans* Ell.

Paspalum pyramidale Nees, Agrost. Bras. 77. 1829. "Habitat in ripae fluminis Amazonum inundatis, ad insulam Marajo et alibi provinciae Paraensis." The type specimen, collected by Martius, in the Munich Herbarium, is labeled. "Marajo, Para, ripa fl. Amazon." It consists of the upper part of a culm with an exceptionally large pyramidal panicle 20 cm. long and 15 cm. wide. The spikelets are glabrous.

Paspalum frankii Steud. Syn. Pl. Glum. 1: 19. 1854. "Frank. Hrb. un. it. 1837 * * * N. Orleans." The type specimen, with the name in Steudel's script, is in the Drake Herbarium in Paris. The sheaths are only minutely papillose.

Paspalum bistipulatum Hochst.; Steud. Syn. Pl. Glum. 1: 29. 1854. "Hrbr. Hostm. sur. nr. 707a. * * * Surinam." The type specimen, in the Drake Herbarium in Paris, has glabrous spikelets.

Cymatochloa fluitans Schlecht. Bot. Zeit. 12: 822. 1854. Based on *Ceresia fluitans* Ell.

⁵⁷ We learn from a sketch of Maj. John Eatton LeConte by Doctor Gray (Bot. Gaz. 8: 197-199. 1883) that LeConte collected in lower Georgia and Florida, that he and his brother established a botanic garden on their father's estate in Georgia, and that when he visited Paris in 1827 (seven years after the publication of his Monographie des especes du genre *Paspalum*) he took his herbarium with him, and that "his acquaintances made free use of his permission to help themselves to the duplicates." His herbarium was presented to the Academy of Natural Sciences, Philadelphia, in 1852, but as Doctor Gray says "There is reason to think, accordingly, that the remains of it which went to the Philadelphia Academy of Natural Sciences will not throw all the light which might be expected upon the species of plants which were described in his published papers." This is true in the case of LeConte's earliest publication, that on *Paspalum*. In his introductory paragraph nothing is said of specimens preserved. His specimens of *Paspalum* now in the Academy are without date or, except in a few cases, locality. They are, therefore, taken as interpretations of LeConte's descriptions, rather than as types, it being evident in several instances that at least additional material entered into the description.

Cymatochloa repens Schlecht. Bot. Zeit. 12: 822. 1854. Based on *Paspalum repens* Berg.

Cymatochloa pyramidalis Schlecht.; Doell in Mart. Fl. Bras. 2²: 98. 1877. The name is incorrectly credited to "Schlecht. Berliner Bot. Zeit." Schlechtendal suggests that *P. pyramidalis*, *P. gracile*, and *P. bistipulatum* apparently belong in *Cymatochloa*, but he does not transfer the names.

Walter⁵⁸ misapplied the name *P. paniculatum* L. to this species.

DESCRIPTION

An aquatic, rarely terrestrial, perennial, with submerged culms, sometimes as much as 2 meters long with tufts of long roots at the nodes and numerous floating branches, the culms soft and spongy, glabrous; nodes dark, sometimes hispid; sheaths commonly overlapping on the branches, those of the floating branches inflated, flask-shaped, papery, often purple-spotted, glabrous, those of aerial branches loose, thin, glabrous (or scabrous above) to sparsely papillose-hispid, in all a prominent erect auricle on either side at the summit; ligule rather firm, erose, strigose, extending up the inner margin of the auricle; blades flat, thin, usually 10 to 20 cm. long, 12 to 15 mm.

wide, sometimes as much as 27 cm. long and 2.5 cm. wide, tapering to both ends, scabrous, often ciliate toward the base, the collar dark-colored, usually strigose; panicles short-exserted, usually 10 to 15 cm. long, 4 to 10 cm. wide, sometimes as much as 20 cm. long of numerous ascending, spreading or recurved rather lax racemes, solitary or in fascicles of 2 or 3 along a slender scabrous axis; racemes tardily falling entire, usually 3 to 5 cm. long, rarely 9 cm. long, the rachis about 1.5 mm. wide, scabrous, often flexuous, naked at the narrowed base and acuminate tip; spikelets solitary, whitish, 1.4 to 2 mm. long, about 0.8 mm. wide, elliptic; glume and sterile lemma very thin, more or less exceeding the fruit and pointed beyond it, 2-nerved, the nerves near the margins, the midnerve suppressed, pubescent with soft spreading hairs to glabrous, the lemma commonly with a V-shaped pinkish stain at base; fruit 1.4 to 1.7 mm. long, 0.6 mm. wide, elliptic, smooth and shining.

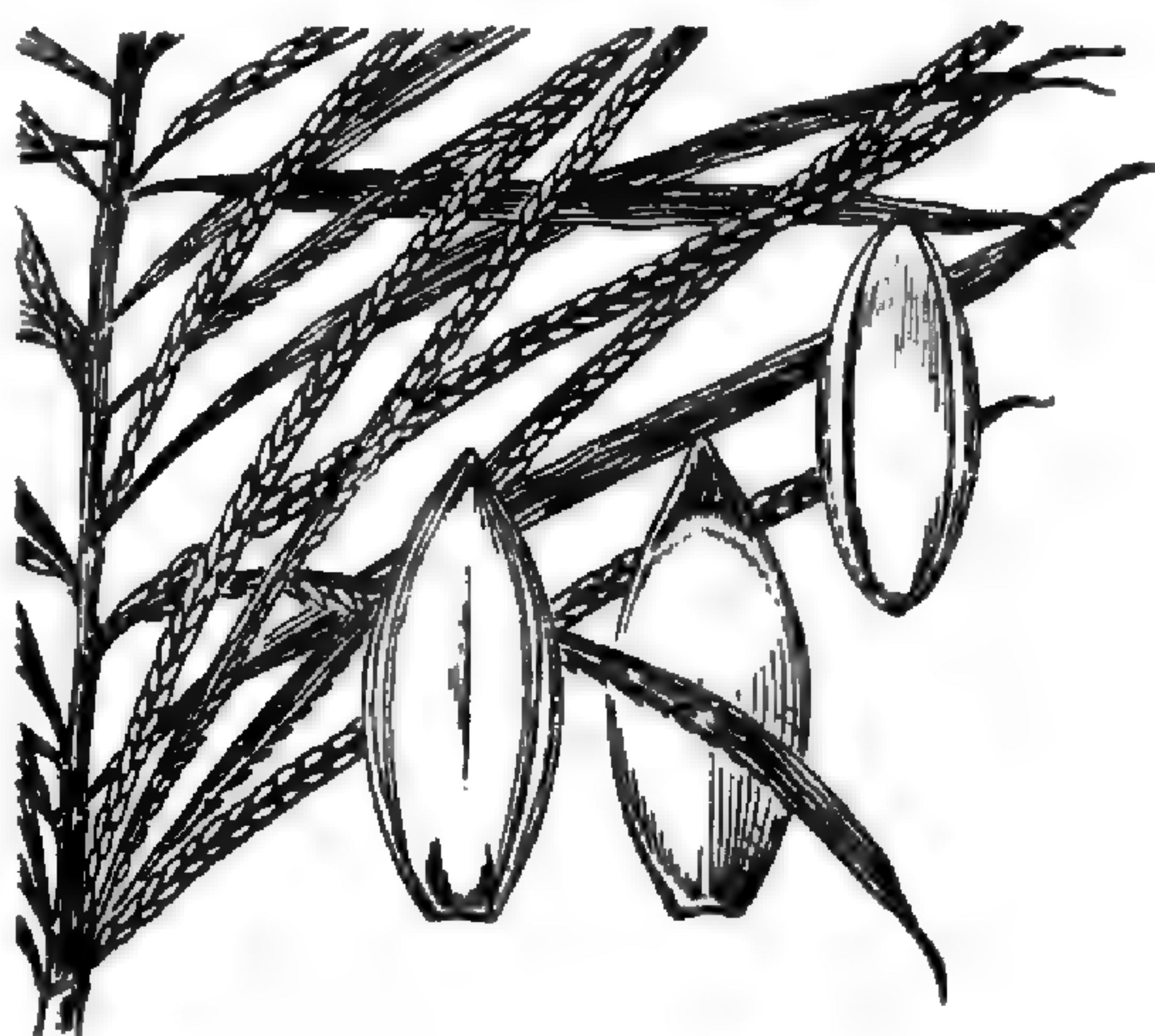


FIGURE 12.—*P. repens*. From Hitchcock 9179

At maturity the numerous racemes are often curled back, the panicle suggesting an ostrich feather.

Terrestrial plants are usually much dwarfed, the base creeping, rooting at the nodes, the flowering branches 10 to 20 cm. tall.

Most of the specimens from the United States have pubescent, even glandular-pubescent, spikelets. In those of the Tropics the spikelets are either pubescent or glabrous. In a few specimens, such as *Smith* 2750, from Colombia, and *Jenman* 6020, from British Guiana, some spikelets are glabrous and others sparsely pubescent. In *Bush* 3695, a terrestrial specimen, some of the spikelets are paired.

Where accessible to cattle this species is readily eaten, the animals wading far into the water to get it. It has been reported from Arkansas as causing trouble by dense growth in drainage canals, and is becoming a troublesome water weed in the Canal Zone, where it is choking the outlet of Pedro Miguel River into Miraflores Lake, and affording a breeding place for mosquitoes.

⁵⁸ Fl. Carol. 75. 1788.

DISTRIBUTION

Floating in sluggish streams or standing water or creeping in wet places, South Carolina to Indiana and Kansas, south to Florida, Texas, the West Indies, and Paraguay.

INDIANA: Dan's Pond, *Deam* 22201, 26591. Patoka, *Deam* 22247. Boonville, *Deam* 24346. Mt. Vernon, *Deam* 22309.

ILLINOIS: Calhoun County, *Metcalf* 1122. Belknap, *Gleason* 2198. Mound City, *Vasey*. Oquawka, *Patterson*. St. Clair County, *Eggert* 255b. Lower Wabash Valley, *Ridgway* 2867. Richland County, *Ridgway* 3344.

MISSOURI: Eagle Rock, *Bush* 376. Lake Side, *Bush* 5164. Butler County, *Bush* 3695. Campbell, *Bush* 6200. Oak Grove, *Bush* 9944. Allentown, *Eggert* in 1886; *Letterman* in 1900. Wicks, *Eggert* in 1887. Chandon County, *Hall* in 1869. St. Louis, *Gladfelter* in 1895. Jasper County, *Palmer* in 1908.

KANSAS: Labette County, *Hitchcock* in 1899. Cherokee County, *Clothier & Whitford* in 1897.

SOUTH CAROLINA: Bluffton, *Millichamp* in 1881.

GEORGIA: Rome, *Chapman*.

FLORIDA: Jacksonville, *Curtiss* 5081 in part. Upper St. John River, *Curtiss* 3563. Dunnellon, *Combs* 912. Old Town, *Combs* 872. Eustis, *Nash* 1699. Istachatta, *Curtiss* 5970. Bartow, *Combs* 1201. Fort Myers, *Hitchcock* 3900. Peace Creek, *Garber* in 1878.

KENTUCKY: Wickliffe, *McFarland & Anderson* 222.

TENNESSEE: Cumberland, *Gattinger* in 1880.

ALABAMA: Blue Rock, Tuscaloosa County, *Harper* 116.

MISSISSIPPI: Columbus, *Tracy* in 1895.

ARKANSAS: Marked Tree, *Bush* 183. Du Valls Bluff, *Letterman* in 1880.

LOUISIANA: Upper Louisiana, *Carpenter*. Natchitoches, *Ball* 159. Marksville, *McAtee* 2164. Alexandria, *Hale* in 1840. Chalmette, *Tracy* 7750. Point-a-la-Hache, *Langlois* in 1886. Jacksonville, *Drummond* in 1835. Baton Rouge, *Brown* 1353.

OKLAHOMA: Copan, *Stevens* 2128. Arkansas, *Bush* 687. Without locality, *Stevens* 4411.

TEXAS: Humble, *Tharp* 4254. Houston, *Fisher* 200, 2089; *Thurrow* in 1898. Columbia, *Bush* 1303. Without locality, *Nealley* in 1884.

TABASCO: San Juan Bautista, *Rovirosa* 44.

GUATEMALA: Without locality, *Bernoulli & Cairo* 964.

EL SALVADOR: Lake Ilopango, *Hitchcock* 8918. Ateos, *Calderón* 1879.

COSTA RICA: Guanacaste, *Jimenez* 726. Puntarenas, *Hitchcock* 8582.

PANAMA: Canal Zone, *Hitchcock* 8031, 9179; *Piper* 5205; *Standley* 28482, 31464. *Curry* in 1928. Chagres River, *D. Popenoe* 36. Mindago River, *Killip* 4231. Matías Hernández, *Pittier* 6808.

JAMAICA: Cornwall, *Harris* 12557. Shettlewood, *Harris* 11641. Westmoreland, *Harris* 11812. Middle Quarters, *Hitchcock* 9582.

TRINIDAD: Caroni Savanna, *Hart* 4194.

COLOMBIA: Santa Marta, *Smith* 2750. Island of Mompos, *Curran* 258. Soplaviento, *Killip & Smith* 14568. Magangue, *Pennell* 3937. Without locality, *Moritz* 1546.

VENEZUELA: Guárico, *Grisol* 24.

BRITISH GUIANA: Georgetown, *Hitchcock* 16526. Yarikita Police Station, *Hitchcock* 17647. Canje River, *Jenman* 1904. Lamaha, *Jenman* 3855*. Coast region, *Jenman* 4442, 6020. Barima River, *Jenman* 7109*. Without locality, *Schomburgk* 358.

FRENCH GUIANA: Without locality, *Lockhart*.

BRAZIL: Río Branco, *Kuhlmann* 3121. Pará, *Goeldi* 120. Ega, *Pöppig* 2863.

Piauí, *Lützelburg* 5538. Joazeiro, *Chase* 7919. Guaporre, *Riedel*.

PARAGUAY: San Bernardino, *Rojas* 1014. Central Paraguay, *Morong* 282.

ECUADOR: Naranjal, *Mille* 11. Balao, *Eggers* 14632; *Jameson* 540.

ARGENTINA: Santa Fé, *Parodi* 3297. Formosa, *Kermes* (*Herb. Parodi*) 3465.

13. *Paspalum longicuspe* Nash

Paspalum longicuspe Nash, N. Amer. Fl. 17: 172. 1912. "Type collected near Guadalajara, Jalisco, Mexico, October 2, 1891, C. G. Pringle 3854 (herb. Columbia Univ.)." The type has been examined; a duplicate is in the National Herbarium.

DESCRIPTION

An aquatic perennial with submerged culms a meter or more long, with ample tufts of long roots at the nodes, and bearing floating flowering branches 20 to 30 cm. long; culms soft, fleshy, drying flat; sheaths mostly overlapping, inflated, serving as floats, often densely spotted with dull purple, scabrous toward the summit, bearing an erect pointed auricle 3 to 6 mm. long; ligule hyaline, brown, about 3 mm. long, lacerate, strigose, bordering the inner margin of the auricle; blades flat, thin, ascending, 6 to 16 cm. long, 6 to 12 mm. wide, narrowed to both ends, very scabrous on both surfaces; panicle finally short-exserted, 7 to 11 cm. long, 3 to 5 cm. wide, consisting of numerous ascending more or less fascicled racemes approximate along a slender stiff scabrous axis; racemes falling entire, 2 to 3.5 cm. long; rachis membranaceous, 2 to 2.5 mm. wide, naked for 2 to 5 mm. at the narrowed base and for about 1 cm. at the acuminate tip, very scabrous, keeled; spikelets solitary, so distant as to appear in a single row, pale, 2.4 mm. long, 1.1 mm. wide, elliptic with an acuminate tip; glume and sterile lemma subhyaline, faintly 2-nerved, the midnerve suppressed, the lemma with a reddish stain at the base; fruit 2 mm. long, 1.1 mm. wide, elliptic, obtuse, smooth and shining, the tip of the palea not included at maturity.

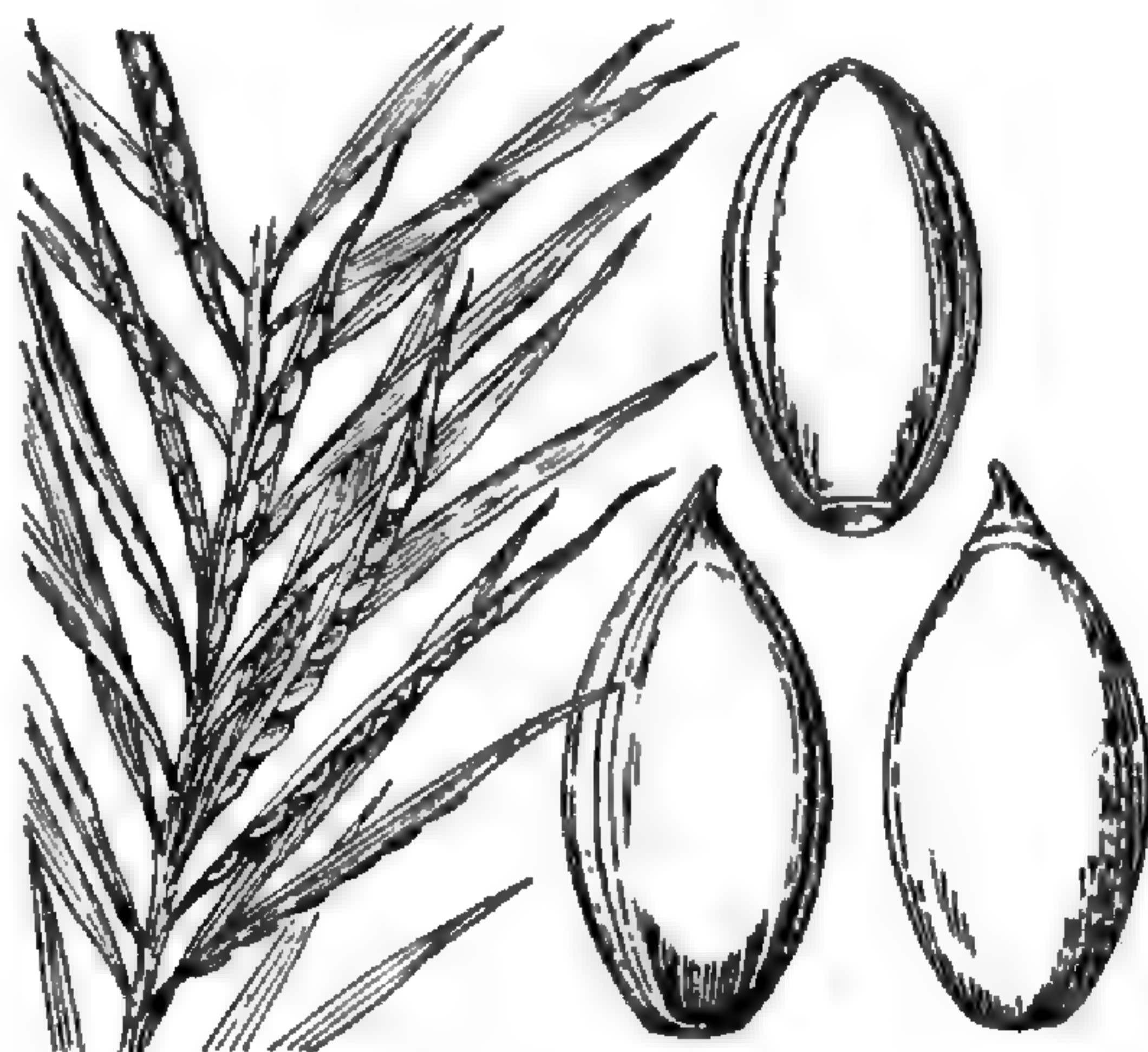


FIGURE 13.—*P. longicuspe*. From type collection

DISTRIBUTION

Floating in water of highland ponds, Mexico.

NAYARIT: San Blas, *Ferris* 5464. Between Mexcaltitlán and Tuxpan, *Mexia* 1022.

JALISCO: Guadalajara, *Pringle* 3854. Orozco, *Hitchcock* 7386.

MEXICO (Republic of): Hecla del Castillo, *Oliva* 31.

14. *Paspalum prostratum* Scribn. & Merr.

Paspalum prostratum Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 24: 9. 1900. "Type specimen 3343 C. G. Pringle, low lands near Pátzcuaro, State of Michoacán [Mexico], November 9, 1890." This specimen, in the National Herbarium, bears the name in Merrill's script.

Paspalum prostratum pygmaeum Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 24: 9. 1900. "Type specimen 7167 C. G. Pringle, Pedregal * * * Valley of Mexico, Federal District, September 30, 1896. In dry places by the railroad track." The type specimen, in the National Herbarium, consists of three dwarf plants more densely pilose than *Pringle* 3343.

DESCRIPTION

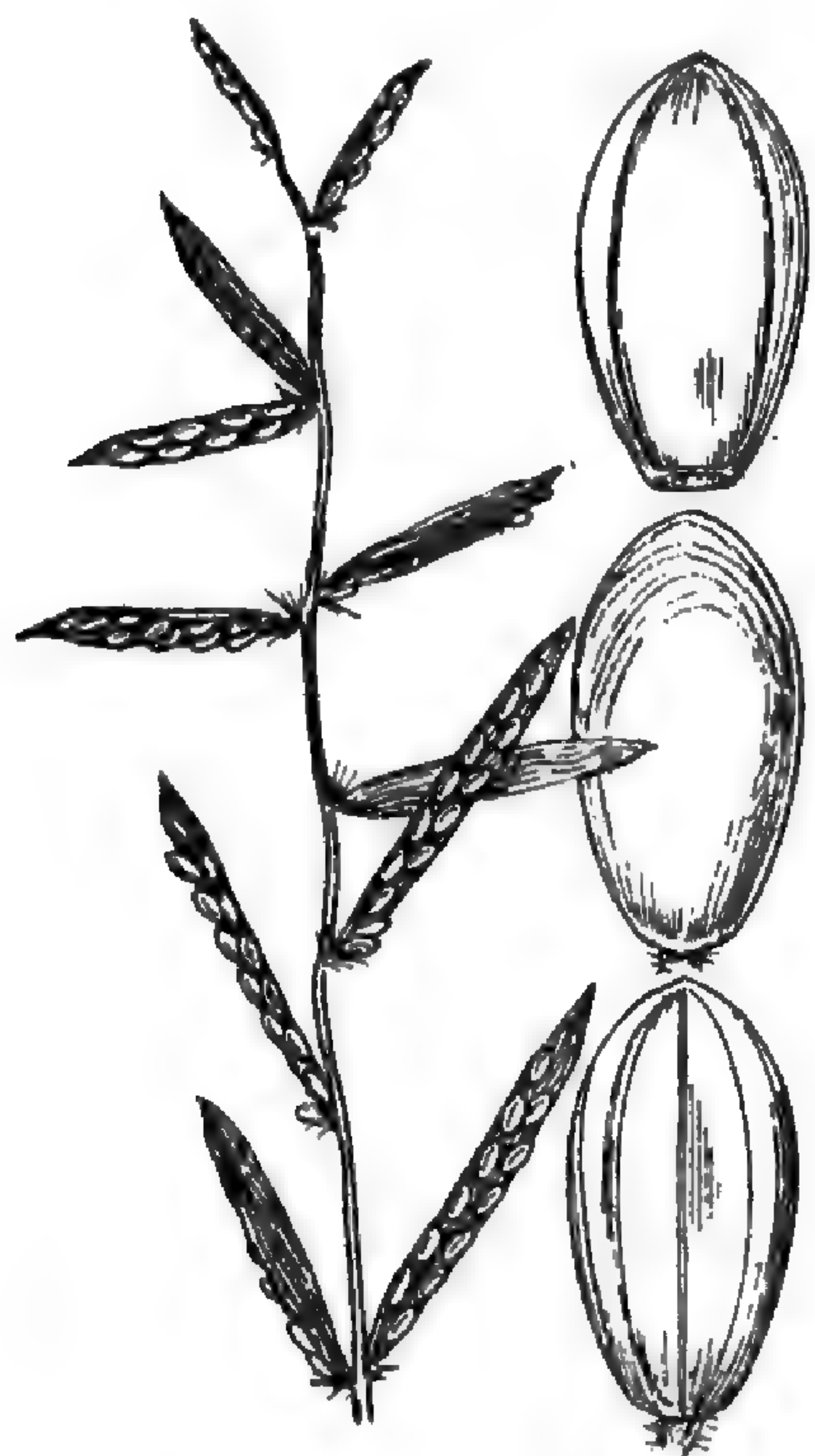


FIGURE 14.—*P. prostratum*. From type specimen

A low annual, the main culms prostrate, rooting at the nodes, bearing ascending often fascicled flowering branches, 5 to 30 cm. tall, these simple or branching from the lower nodes; culms flattened, striate, glabrous; sheaths thin, loose, compressed, from sparsely pilose along the margin and otherwise glabrous to densely pilose; ligule hyaline, scarcely 0.5 mm. long; blades flat, thin, 1.5 to 8 cm. long, 5 to 12 mm. wide, rounded to subcordate at base, abruptly acuminate, with a serrulate white cartilaginous margin, papillose-pilose on both surfaces, more densely so beneath; racemes 3 to 12, spreading, solitary or subfasciculate, the lower remote, falling entire, 1 to 3 cm. long, the common axis flattened, striate, 5 to 12 cm. long; rachis membranaceous, about 2.5 mm. wide, pilose at base and with a scabrous white cartilaginous margin, abruptly acuminate beyond the uppermost spikelet; spikelets solitary, mostly in 2 rows but sometimes so widely spaced as to appear as if one, whitish, 2.1 to 2.2 mm. long, about 1.1 mm. wide, obovate-elliptic, glabrous;

glume and sterile lemma very thin, 3-nerved, the lemma sometimes with a pair of faint intermediate nerves; fruit about the size of the spikelet, smooth and shining.

Fendler's no. 1696 from Venezuela, with narrower blades and less spreading habit, is doubtfully referred here.

DISTRIBUTION

Moist slopes at middle and higher altitudes, southern Mexico to Bolivia.

HIDALGO: Trinidad Iron Works, *Pringle* 8891.

MICHOACÁN: Morelia, *Arsène* 3129, 8684. Pátzcuaro, *Pringle* 3343.

COLOMBIA: Bogotá, *Idinael* 278. La Baja, *Killip & Smith* 18024. California, *Killip & Smith* 16936. Coconuco, *Killip* 6861. Guasca, *Ariste Joseph* A458 b, A463 a. Chiquinquirá, *Ariste Joseph* in 1909.

BOLIVIA: Sorata, *Holway* 507.

15. *Paspalum candidum* (Humb. & Bonpl.) Kunth

Reimaria candida Humb. & Bonpl.; Flüge, Monogr. Pasp. 214. 1810. "Locus natalis. Prope Puanbo [Puembo] in America meridionali," Ecuador. There are several Humboldt and Bonpland collections from Puembo, Ecuador, named *Paspalum candidum* or *Reimaria candida*. On those in the Willdenow and the Berlin herbaria and in the British Museum, the locality is misspelled "Puanbo," as in Flüge's work. The specimen in the Bonpland Herbarium in the Paris Herbarium is labeled Puembo. The specimen in the Berlin Herbarium bears both names in Kunth's script. Flüge seems to have used Willdenow's herbarium, and the specimen there, in a folder marked "*Paspalum confertum*—*Reimaria candida*," may be Flüge's type.

Paspalum candidum Kunth, Mem. Mus. Hist. Nat. 2: 68. 1815. Based on *Reimaria candida* Humb. & Bonpl. as published by Flügge.

Paspalum confertum Willd.; Steud. Nom. Bot. ed. 2, 2: 270. 1841, as synonym of *P. candidum*. This name with "*Reimaria candida*" is on the folder of *Paspalum candidum* in the Willdenow Herbarium (see above).

Paspalum uniseriatum Steud.; Lechl. Berb. Amer. Austr. 55. 1857. A name only, assigned to Lechler's no. 1862, from Peru. This collection so named in Steudel's script is in the Paris Herbarium.

DESCRIPTION

A straggling or clambering annual, ascending from a decumbent base, often rooting at the geniculate nodes, freely branching, the branches divergent; culms commonly 1 meter or more long, smooth and shining, drying compressed or grooved; nodes dark, swollen, often strigose, rarely hirsute; sheaths loose, thin, usually shorter than the internodes, ciliate toward the summit and with a few long hairs at the apex or glabrous; ligule hyaline, about 1.5 mm. long, erose; blades flat, thin, spreading, 5 to 10 cm. long, 6 to 20 mm. wide, oblong-elliptic, softly pubescent on both surfaces to glabrous; panicle usually short-exserted, 5 to 12 cm. long, of 8 to 20 ascending or arched-spreading racemes, falling entire, 2 to 4 cm. long; rachis membranaceous, 2 to 2.5 mm. wide, more or less trough-shaped, scabrous, pilose at the very base and extending 2 to 3 mm. beyond the spikelets; spikelets solitary, often so distant as to appear to be in a single row, not appressed, but somewhat spreading from the rachis, white, 2.3 to 2.5 mm. long, about 1.1 wide, oblong-elliptic; glume wanting, the sterile lemma equaling the fruit, very thin, 3-nerved, glabrous; fruit the size of the spikelet, white, smooth and shining.

DISTRIBUTION

Moist shaded banks and slopes and in recently disturbed soils, up to 1,800 meters altitude, Vera Cruz to Chile.

VERA CRUZ: Jalapa, *Pringle* 7884.

GUATEMALA: Solola, *Holway* 168. Cobán, *Johnson* 621; *Popenoe* 913. Alta Verapaz, *Johnson* 119, 831. Guatemala City, *Hitchcock* 9144. Dept. Santa Rosa, *Heyde & Lux* (*Dist. Smith*) 4300.

EL SALVADOR: Volcano Salvador, *Hitchcock* 8937. Ahuachapán, *Standley* 19787.

COSTA RICA: Yerba Buena, *Standley & Valerio* 50018. Cerros de Zurquí, *Standley & Valerio* 50626. Viento Fresco, *Standley & Torres* 47838. Rio Reventado, *J. D. Smith* 4992. Cartago, *Cooper* 75; *Torres* 14. San José, *Cooper* (*Dist. Smith*) 5995; *Hitchcock* 8477; *Tonduz* 8492, 9854;⁵⁹ *Jiménez* 128; *Standley* 39016. San Francisco de Guadalupe, *Tonduz* (*Dist. Smith*) 7193. Between San Pedro Montes de Oca and Curridabat, *Standley* 32779, 41256. Santa Maria de Dota, *Standley* 41606; *Standley & Valerio* 43214. La Verbena, *Standley* 32268.

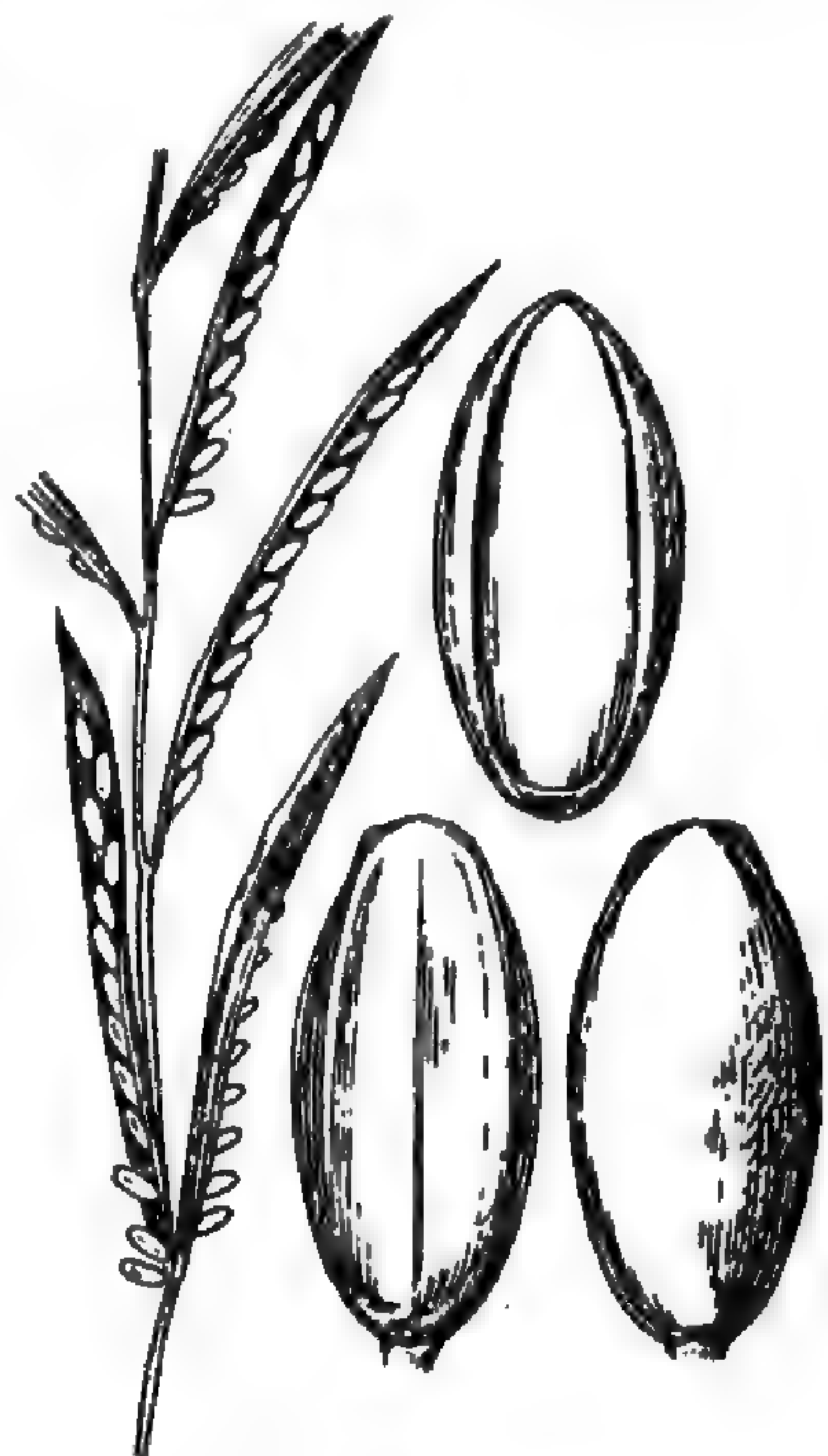


FIGURE 15.—*P. candidum*. From type specimen and *Hitchcock* 8937

⁵⁹ Many collections bear both a serial number of the "Herb. Instit. physico-geogr. nat. costaricensis," and also a serial number of the John Donnell Smith Herbarium. The Herb. Costaricense number only is here cited.

PAÑAMA: El Boquete, *Killip* 4510.

COLOMBIA: Medellín, *Toro* 675. California, *Killip & Smith* 17018. Río Paez Valley, *Pittier* 1238. Camino del Gachetá, *Ariste Joseph A* 550. "New Granada," *Triana* 258.

VENEZUELA: Silla de Caracas, *Warming* in 1891-92.

ECUADOR: Quito, *Heilborn* 539. Chillo, *Sodirol* 300. Nono, *Sodirol* in 1887. Huigra, *Rose* 22582. Las Juntas, *Rose* 23219. Cumbe, *Rose* 22957.

PERU: Obrajillo, *Wilkes Expl. Exped.* Mito, *Macbride & Featherstone* 1366. Cuzco, *Pennell* 13991. Machu Picchu, *Cook & Gilbert* 858. Muña, *Macbride* 3951. Without locality, *Lechler* 1862; *Heyne*.

BOLIVIA: San Felipe, *Hitchcock* 22597.

CHILE: Valparaiso, *Gunther* 33.

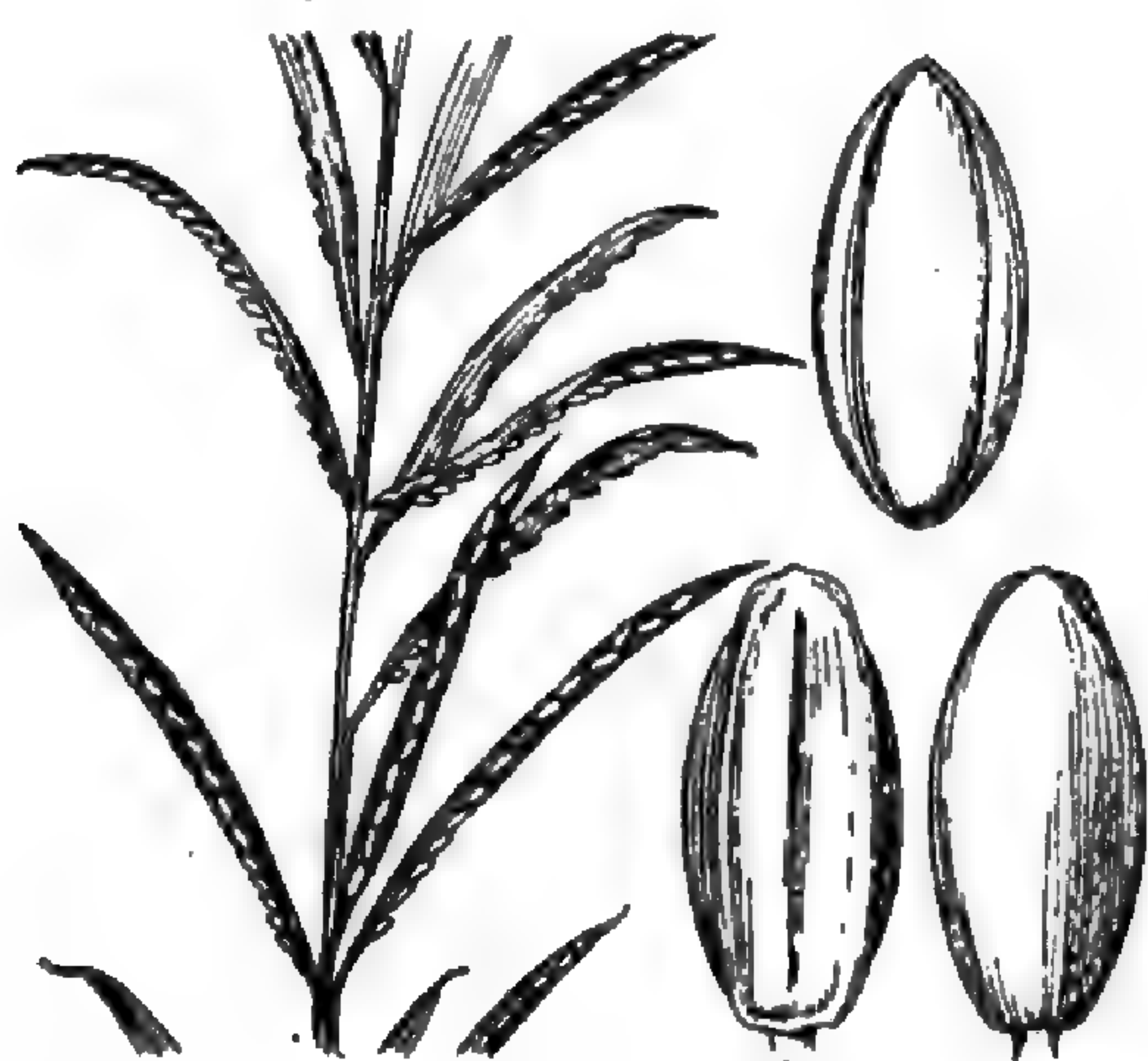


FIGURE 16.—*P. scabrum*. From type specimen

16. *Paspalum scabrum* Scribn.

Paspalum scabrum Scribn. U. S. Dept. Agr. Div. Agrost. 4: 36. pl. 3. 1897. "Guatemala, No. 3903 Heyde & Lux, 1892." The type specimen, in the United States National Herbarium, bears the name in Scribner's script. On plate 3 the specific name is erroneously given as "*scabriusculum*."

DESCRIPTION

A straggling or clambering annual, with elongate culms ascending from a decumbent base, bearing a few long divergent branches, striate, sometimes vinous purple, very scabrous, the nerves beset with minute backwardly pointed prickles; nodes retrorsely strigose; sheaths overlapping toward the summit of the branches, loose, scabrous like the culms; ligule hyaline, about 2 mm. long, lacerate; blades flat, thin, spreading or reflexed, 5 to 10 cm. long, 1 to 2.4 cm. wide, lanceolate-elliptic, papillose-pilose on both surfaces; panicles short-exserted or included at base, 11 to 20 cm. long, 4 to 5 cm. wide, of 20 to 50 spreading subfasciculate racemes along a grooved very scabrous axis, the racemes falling entire, 1.5 to 5 cm. long; rachis membranaceous, thin, with a strong midnerve, scabrous, about 2 mm. wide, the acuminate apex extending 2 to 3 mm. beyond the spikelets, pilose at base; spikelets solitary, so distant as to appear in a single row, somewhat divergent from the rachis, white, 1.8 to 1.9 mm. long, about 0.8 mm. wide, oblong-elliptic; glume wanting; sterile lemma equaling the fruit, thin, glabrous, 3-nerved; fruit the size of the spikelet, white, smooth and shining.

DISTRIBUTION

Brushy slopes, up to 2,800 meters, Guatemala to Ecuador.

GUATEMALA: Chupadero, Dept. Santa Rosa, *Heyde & Lux (Dist. Smith)* 3903.

COLOMBIA: California, *Killip & Smith* 16969, 18487. Between Piedecuesta and Las Vegas, *Killip & Smith* 15494. Chinácota, *Killip & Smith* 20810. Líbano, *Pennell* 3318.

ECUADOR: Guayaquil, *Hitchcock* 19948. Milagro, *Hitchcock* 20274.

17. *Paspalum racemosum* Lam.

Paspalum racemosum Lam. Tabl. Encycl. 1: 176. 1791. "E Peru. Com. D. boutelou." The type, bearing the name and a diagnosis in Lamarck's script, is in the Paris Herbarium. The panicle is 15 cm. long, the spikelets brown.

Paspalum stoloniferum Bosc, Trans. Linn. Soc. 2: 83. pl. 16. 1794. "H. in Perua." A specimen from "herb Bosc." in the herbarium at Padua is probably the type.

Milium latifolium Cav. Icon. Pl. 3: 37. pl. 273. 1794. "Habitat in Peru." The type specimen has not been examined, but the description and the crude plate identify the species.

Paspalum purpureum Ruiz & Pav. Fl. Peruv. Chil. 1: 47. 1798. "Habitat in Peruviae cultis." A specimen in the Berlin Herbarium labeled "*Paspalum* (mayzillo vulgo) *purpureum* Flor. Peruv. Ruiz, in Peruviae cultis" in Ruiz's script, is probably part of the type.

Paspalianthum stoloniferum Desv. Opusc. 59. 1831. Based on *Paspalum stoloniferum* Bosc.

Maizilla stolonifera Schlecht. Bot. Zeit. 8: 605. 1850. Based on *Paspalum stoloniferum* Bosc.

Paspalum biglume Steud. Syn. Pl. Glum. 1: 24. 1854. Described from a specimen cultivated in the botanic garden at Göttingen under the name *Paspalum stoloniferum* Bosc. The type specimen, bearing the name in Steudel's script, is in the Paris Herbarium.

Paspalum manabiense Mez, Repert. Sp. Nov. Fedde 15: 30. 1917. "Ecuador: Prov. Manabi, prope Hacienda El Recreo (Eggers no. 14965)." The specimens of this collection in the Berlin and the Munich herbaria bear the name in Mez's script. Both consist of small plants with small panicles of pale spikelets.

DESCRIPTION

A glabrous, widely spreading or clambering annual; culms as much as 1 meter long, rooting at the nodes, with rather numerous ascending branches; nodes dark brown; sheaths thin, loose, the upper more or less inflated; ligule 2 to 3 mm. long, erose, decurrent on the sheath as a brown hyaline margin; blades flat, thin, spreading, 4 to 12 cm. long, 1 to 2 cm. wide, acuminate, tapering to a rounded or subcordate base, often glaucous beneath, scabrous on the margin, otherwise smooth; panicles terminal, from pale tawny to ferruginous or dark purple, 10 to 20 cm. long, 1.5 to 2.5 cm. wide, of numerous (20 to 80 or more) ascending subfasciculate racemes, somewhat crowded along a slender axis, the racemes falling entire, 1 to 2 cm. long; rachis flat, pale-green, about 1 mm. wide, terminating at the base of the uppermost spikelet, short-pubescent at base, the margin scabrous; spikelets solitary on short pubescent pedicels, imbricate in 2 rows, pale tawny to ferruginous or brownish purple, about 2.7 mm. long and 1.2 mm. wide, elliptic, abruptly pointed; glume and sterile lemma thin, loose, much exceeding the fruit, ciliate at the apex, 1-nerved, the glume rugulose across the lower one-third to half, fluted or deeply wrinkled just within the margin, the internerves of the sterile lemma deeply transversely fluted at maturity, plane on the margins and down the center; fruit 1.5 mm. long, 0.6 mm. wide, narrowly obovate, pale, smooth and shining.

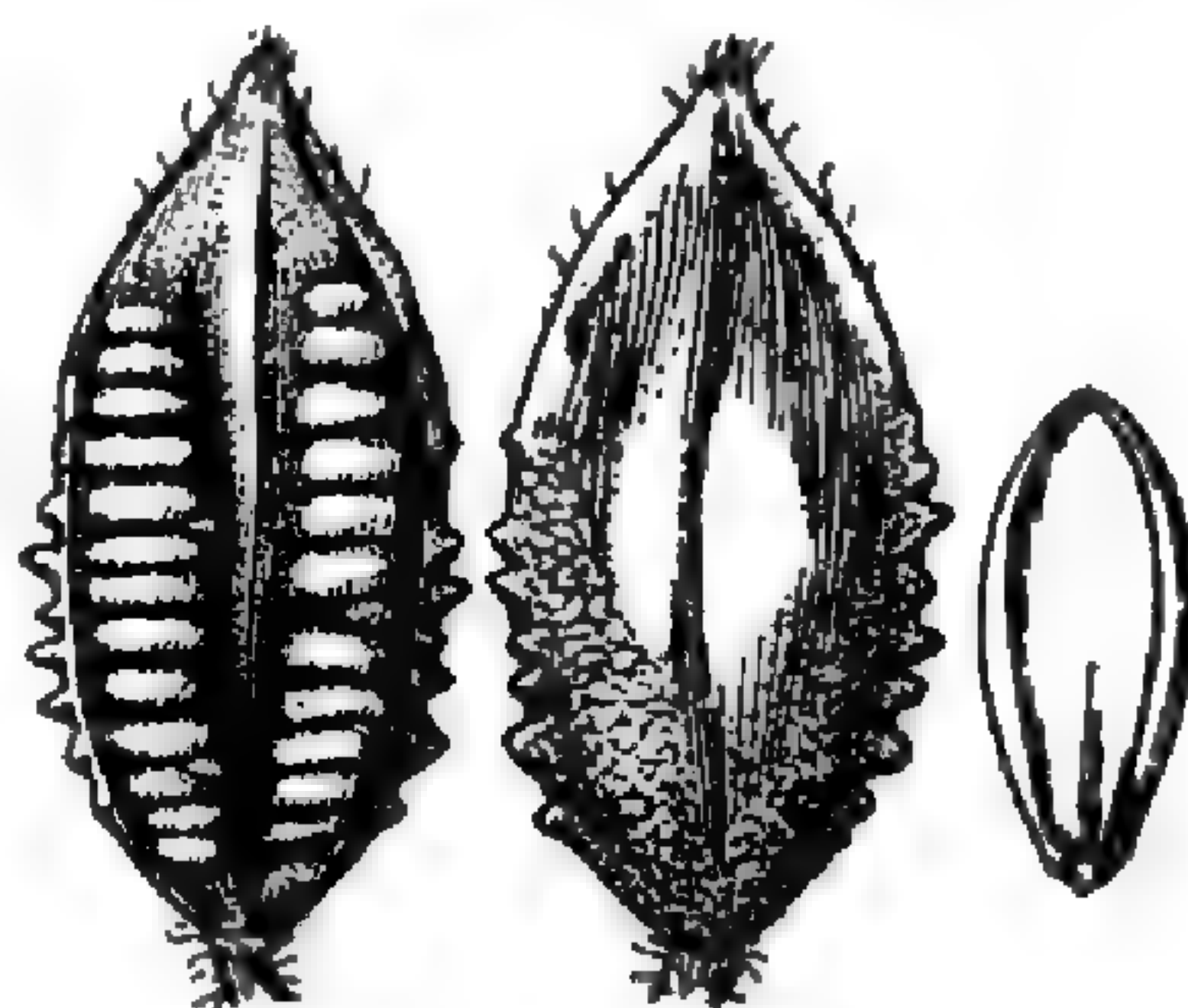


FIGURE 17.—*P. racemosum*. From type specimen of *P. stoloniferum*

DISTRIBUTION

In recently disturbed soils, fields, waste places, and roadsides, Ecuador and Peru; introduced as an ornamental and sparingly escaped in the West Indies, Brazil, and Peru.

CUBA: Habana, *Léon* 759.

DOMINICAN REPUBLIC: *Poiteau*.

BRAZIL: Pará, *Goeldi* in 1909.

ECUADOR: El Recreo, *Eggers* 14965. Perucho, *Sodi*ro. Huigra, *Hitchcock* 20341; *Holway* 823; *Rose* 22162, 24017, 24022, 24025. Guayaquil, *Anthony & Tate* 79; *Hitchcock* 19955, 20132, 20134. Huataxi, *Spruce* 5959 (Kew Herb.).

PERU: Lima, *Hitchcock* 22338; *Wilkes Expl. Exped.*; *Mathews* 425, 426; *Savatier* 1188. Santa Clara, *Rose* 18742. "Callao et Lima," *Didrichson* 4387. Cerro de la Brea, *Haught* 108.

18. *Paspalum crassum* Chase

Paspalum crassum Chase, Contr. U. S. Nat. Herb. 17: 239. 1913. "Type in the U. S. National Herbarium, no. 691235, collected in prairie, among high grass and weeds, 450 meters altitude, at Alzada, Colima, Mexico, September 21, 1910, by A. S. Hitchcock (no. 7093)." This specimen is 2 meters tall, but immature, the margin of the fruits not yet inrolled.

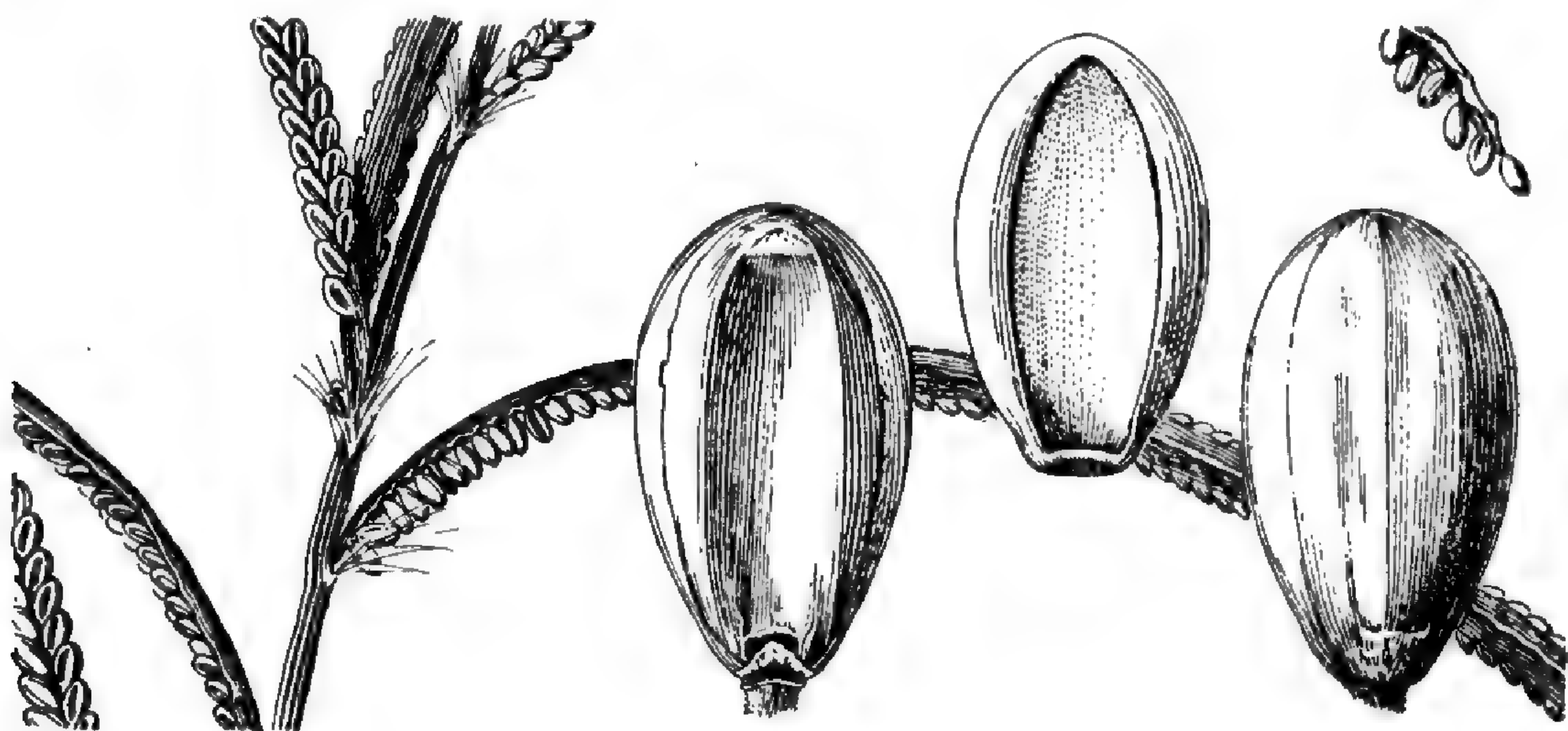


FIGURE 18.—*P. crassum*. From type specimen

DESCRIPTION

A large, coarse annual, producing prop-roots from the lower nodes; culms stout, erect, 40 cm. to 2 meters tall, simple or sparingly branching from the lower nodes, papillose-hirsute below the nodes and toward the summit; sheaths loose, longer than the internodes, coarsely papillose-hispid; ligule membranaceous, about 5 mm. long, lacerate; blades flat, 15 to 60 cm. long, 2.5 to 3 cm. wide, tapering to the base, conspicuously papillose-hispid on both surfaces, the midnerve prominent beneath; panicle 10 to 20 cm. long, the axis strongly angled; racemes 4 to 10, arched-ascending, 5 to 15 cm. long; rachis about 3 mm. wide, scabrous, pilose at the base; spikelets solitary or occasionally paired, imbricate but scarcely crowded, pale green, 3.1 to 3.3 mm. long, 1.7 to 2 mm. wide, oval, turgid, slightly concave on the face, blunt, glabrous; first glume minute or obsolete, firm; second glume and sterile lemma subchartaceous, covering the fruit, the sterile lemma inclosing a hyaline palea and a more or less developed staminate flower; fruit minutely papillose-striate, the margin of the lemma thin and flat before maturity, then inrolled.

In its coarse hispid foliage and thick prop-roots this species resembles *Echinochloa walteri* (Pursh) Heller. The only closely related species is *Paspalum tumidum* Kuhl. of Brazil. It is placed in the Dissecta group because of the winged rachis, but is not closely allied to the other species of this group.

DISTRIBUTION

Open moist grassy ground, Mexico, Venezuela, and Peru.

COLIMA: Alzada, *Hitchcock* 7093.

EL SALVADOR: Ahuachapán, *Padillo* 393.

VENEZUELA: Without locality, *Moritz* in 1865 (British Museum).

PERU: Colonia Perené, Junín, *Hitchcock* 22076.

Disticha.—Creeping perennials with wiry subcompressed culms, producing stolons or rhizomes; racemes 2, conjugate or approximate, occasionally a third below (racemes 2 to 5 in *P. paucispicatum*); spikelets somewhat pointed.

Second glume pubescent; spikelets relatively turgid.

Spikelets solitary or occasionally paired; racemes usually 2__21. *P. distichum*.

Spikelets mostly paired; racemes usually 3_____22. *P. paucispicatum*.

Second glume and sterile lemma glabrous; spikelets flattened.

Blades erect or ascending, involute-setaceous_____20. *P. distachyon*.

Blades spreading, tapering from base to apex, the margins involute.

19. *P. vaginatum*.

19. *Paspalum vaginatum* Swartz

Paspalum vaginatum Swartz, Prodr. Veg. Ind. Occ. 21. 1788. "Jamaica." In the Swartz Herbarium are two sheets of the Swartz collection, both leafy upright branches without the creeping base, the racemes mature, widely expanded or reflexed.

Paspalum littorale R. Br. Prodr. Fl. Nov. Holl. 188. 1810. "Littora Novae Hollandiae intra tropicum." The type specimen in the British Museum was collected by "R. Brown, * * * Banks of Patterson's River, Oct. 1804." Sprengel⁶⁰ misspells the name "litorale."

Digitaria foliosa Lag. Gen. & Sp. Nov. 4. 1816. "Habitat in Havana, ubi legit D. Balth. Boldo." The specimen in the Madrid Herbarium, consisting of 3 small tufts, is labeled "ex Havana, Boldo iter."

Paspalum tristachyum LeConte, Journ. de Phys. 91: 285. 1820. "Habitat in subsalsis Georgiae." The specimen in the herbarium of the Academy of Natural Sciences, Philadelphia, bearing this name in LeConte's script is a single culm of *P. vaginatum* bearing 3 racemes. It agrees well with LeConte's description and is accepted as the type. A specimen from LeConte so named by him in the Paris Herbarium has 2 racemes.

Digitaria tristachya Schult. Mant. 2: 261. 1824. Based on *Paspalum tristachyum* LeConte.

Paspalum brachiatum Trin.; Nees, Agrost. Bras. 62, 1829, as synonym of *P. vaginatum*. "Sieber Herb. Martin." This specimen in the Trinius Herbarium has three racemes.

Paspalum foliosum Kunth, Rév. Gram. 1: 25. 1829. Based on *Digitaria foliosa* Lag.

Paspalum kleineanum Presl, Rel. Haenk. 1: 209. 1830. "Hab. in Peruviae arenosis." The type specimen, collected in Peru by Haenke, is a small plant with short rhizome and crowded involute blades. Presl states that a specimen of this species from India sent by Klein is preserved in the Willdenow Herbarium. While the species is named *P. kleineanum*, the Haenke specimen is taken as the type, since that is the plant described.

⁶⁰Syst. Veg. 1: 244. 1825.

Paspalum inflatum A. Rich. in Sagra, Hist. Cuba 11: 298. 1850. "Crescit in locis sabulosis et maritimis insulae Cubae, circa Havanam." The type specimen collected by Ramon de la Sagra bearing the name in Richard's script, in the Paris Herbarium, is a mixture of *P. vaginatum* and *P. distichum*, the vegetative part being mostly *P. distichum*, the inflorescence *P. vaginatum*. The description states that the spikelets are glabrous, for which reason *Paspalum inflatum* is referred to *P. vaginatum*. A second specimen of this collection in the Drake Herbarium is entirely *P. vaginatum*.

Paspalum vaginatum var. *longipes* Lange, Naturhist. For. Kjöbenhavn Vid. Medd. 1854: 44. 1854. Described from the province of Galicia, Spain. The type, or part of it, collected by Lange and bearing the name in his script is in the Delessert Herbarium. The racemes are naked for 6 to 10 mm. at the base.

Paspalum squamatum Steud. Syn. Pl. Glum. 1: 21. 1854. "Jardin legit in Guinea." The type, bearing the name in Steudel's script, is in the Institut Botanique, Caen. A duplicate with Steudel's script is in the Paris Herbarium.

Paspalum didactylum Salzm.; Steud. Syn. Pl. Glum. 1: 20, 1854, as synonym of *P. vaginatum*. "Salzm. hrbr." The Salzmann collection from "Bahia; in maritimis," Brazil, was examined in the Montpellier, Munich, Delessert, and Kew herbaria.

Paspalum distichum var. *tristachum* Wood, Class-book 783. 1861. No specimen nor locality is cited. The description of the species indicates *P. vaginatum*, not *P. distichum*, the variety differentiated only by "spikes in 3's, closely approximate."

Paspalum distichum var. *vaginatum* Swartz; Griseb. Fl. Brit. W. Ind. 541. 1864. Based on *P. vaginatum* Swartz.

Paspalum reptans Poir.; Doell in Mart. Fl. Bras. 2²: 75, 1877, as synonym of *P. vaginatum*. "In Lamarckii herbario, ex parte."

Paspalum vaginatum var. *nanum* Doell in Mart. Fl. Bras. 2²: 75. 1877. "Prope Rio de Janeiro (Glaziou n. 4346)." The type, bearing the name in Doell's script in the Berlin Herbarium consists of two depauperate tufts with culms only 4 and 6 cm. tall and spikelets barely 3 mm. long.

Paspalum reimarioides Chapm. Fl. South. U. S. 665. 1883. Not *P. reimarioides* Brongn. 1830. "Brackish marshes along the coast, West Florida." The type specimen has not been located, but in the United States National Herbarium is a specimen sent under this name to Doctor Vasey in 1884 by Doctor Chapman. The description and this specimen serve to identify the species which is the same as that described by Chapman in the same work as *P. vaginatum* Swartz, as shown by Chapman specimens so labeled, though the Chapman specimen sent as *P. reimarioides* is an exceptionally lax plant with three racemes.

Paspalum distichum var. *littorale* F. M. Bailey, Queensland Grasses 23. 1888. Presumably based on *P. littorale* R. Br., though that name is not cited.

Paspalum vaginatum var. *reimarioides* Chapm. Fl. South. U. S. ed. 3. 577. 1897. "Saline marshes along the coast, Florida and westward." Probably based on *P. reimarioides* Chapm. The description applies to large specimens of *P. vaginatum*.

Paspalum distichum var. *nanum* Stapf in Dyer, Fl. Cap. 7: 371. 1898. Based on *P. vaginatum* var. *nanum* Doell.

Sanguinaria vaginata Bubani, Fl. Pyr. 4: 258. 1901. Based on *Paspalum vaginatum* Swartz.

Paspalum distichum var. *anpinense* Hayata, Icon. Pl. Formosa 7: 55. f. 27. 1918. "Anpin, Sept. 1913, leg. T. Soma," Formosa. The type has not been examined. The description and figure indicate a specimen of *P. vaginatum* with spikelets in which the midnerve of the glume, but not that of the sterile lemma, is suppressed.

By a typographical error this species is listed as "*P. variegatum* Swz." by Vasey.⁶¹ On the following page the name is correctly given as *P. vaginatum*.

Raddi⁶² refers a Brazilian specimen to "*Paspalus longiflorus*. P. Beauv. Fl. de Ow. II. 46. t. 85 ?" In Beauvois' work Willdenow is given as author of this name. Willdenow⁶³ cites "Retz. obs. 4. p. 15." That is *Digitaria longiflora* (Retz.) Pers. (*Syntherisma longiflora* Skeels). Raddi's specimen in the herbarium at Pisa consists of 5 plants of *P. vaginatum*, three with 2 racemes, one with three, and one with 5 racemes. Beauvois' plate represents *P. vaginatum*.

DESCRIPTION

An extensively creeping perennial, with horizontal rhizomes, pale, glabrous as a whole, stoloniferous, often forming extensive colonies, the stolons sometimes slender and wiry, sometimes stout and almost succulent, up to a meter or more long, the culms subcompressed, usually grooved, the short broad loose often overlapping sheaths bladeless or with short reflexed blades; branches ascending or erect, usually the greater number on any plant sterile with overlapping sheaths and conspicuously distichous, stiffly ascending blades,

the flowering shoots 8 to 60 cm. tall (the upturned end of a runner sometimes flowering), simple or branching, the branches sometimes aggregate, forming dense tufts of stiff foliage; sheaths commonly overlapping, broad, loose, often keeled, the summit with small auricles; ligule membranaceous, about 0.5 mm. long, with a ring of soft white hairs back of it, the hairs sometimes 5 mm. long; blades 2.5 to 15 cm. long, 3 to 8 mm. wide at base, narrower than the summit of the sheath, taper-

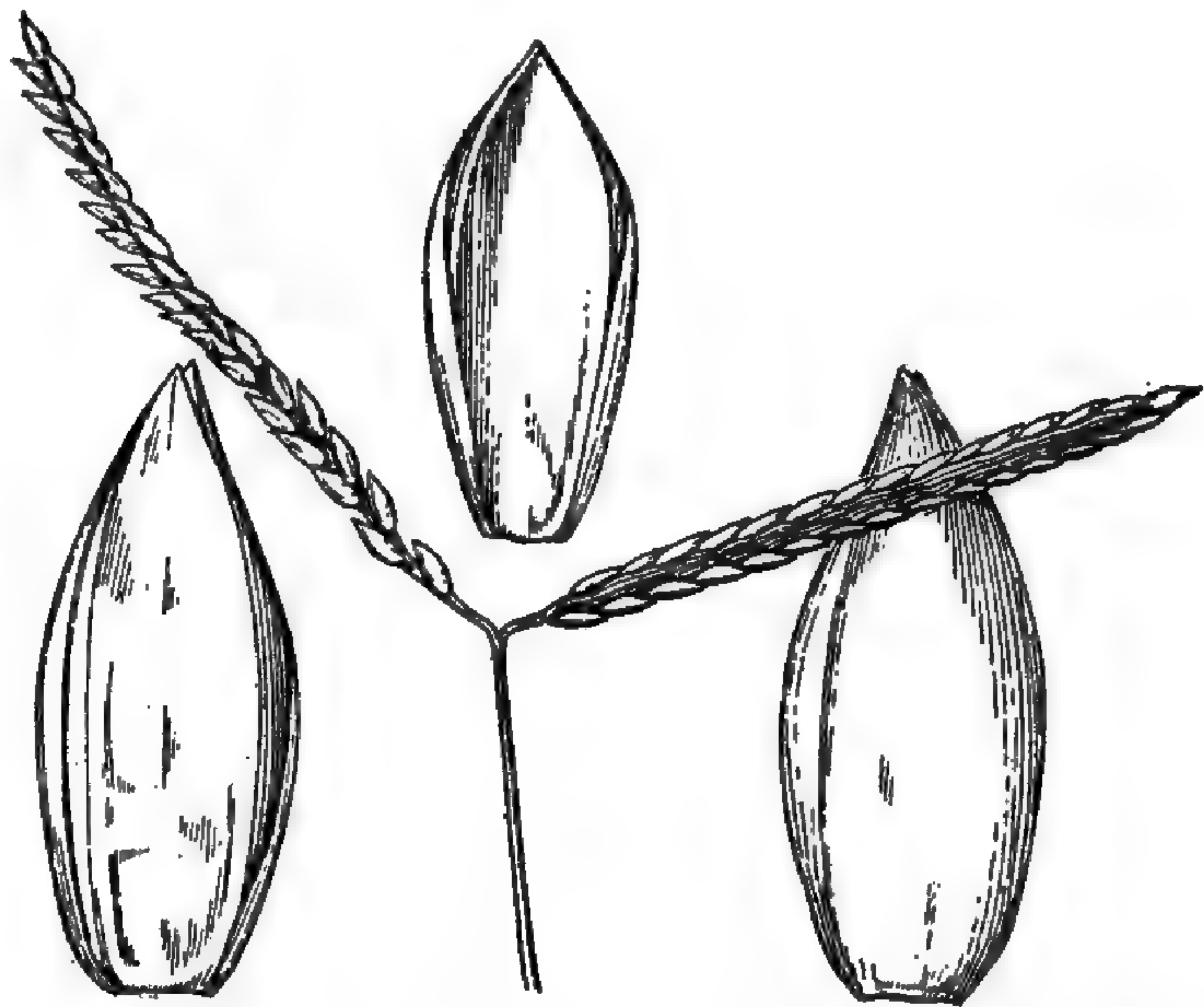


FIGURE 19.—*P. vaginatum*. From type specimen and Hitchcock 9866

ing from the abruptly contracted base to an involute apex, usually firm, sometimes subrigid, ascending commonly at a uniform angle; peduncles compressed, commonly short or included; racemes commonly 2, rarely as many as 5, conjugate or closely approximate, at first erect and appressed together, usually spreading or reflexed at maturity, often subfalcate, 1.5 to 7.5 cm. long; rachis naked at base forming slender peduncles, 1 to 2 mm. (rarely to 2.5 mm.) wide, triangular, flexuous, minutely scabrous on the margin; spikelets solitary, imbricate, except the lower ones, 3 to 4.5 mm. long (commonly 3.5 to 4 mm.), 1.2 to 1.5 mm. wide, ovate-lanceolate, acute, pale stramineous; first glume rarely developed; second glume and sterile lemma equal, thin in texture, weakly 5-nerved but the midnerve of both usually suppressed, the sterile lemma often transversely undulate, sometimes conspicuously so; fruit 2.5 to 3 mm. long, narrowly obovate, subacute, slightly concavo-convex.

⁶¹ Bot. Gaz. 9: 54. 1884.

⁶² Agrost. Bras. 24. 1823.

⁶³ Sp. Pl. 1: 332. 1797.

Rarely the upright shoots are so congested on a short-jointed, vertical rhizome as to produce a more or less tufted plant. Depauperate plants of this character are the form described as *P. vaginatum nanum* Doell. Such plants are *Ekman* 13392 and *Chase* 8221. In the latter, from a dry rocky cliff above the sea at Leblon, Rio de Janeiro, the little tufts above the surface appear quite distinct from *P. vaginatum*, but the stout horizontal underground parts are those of typical *P. vaginatum*. Plants from adjoining more favorable spots are taller, with longer racemes, and undoubtedly referable to *P. vaginatum*.

DISTRIBUTION

Seacoasts and brackish sands, often forming a pure stand, from North Carolina to Florida, Texas, Mexico, and the West Indies to Argentina, and on the Pacific coast from Lower California to Cocos Island and Chile; also found on tropical and subtropical coasts of the Eastern Hemisphere.

A good soil binder on low sandy coasts.

NORTH CAROLINA: Ocracoke Island, *Kearney* 2281.

FLORIDA: Apalachicola, *Kearney* 120. St. Vincent Island, *McAtee* 1689 A. Jacksonville, *Curtiss* 3576*; *Hitchcock* 2465. Indian River, *Curtiss* 3567* in part. Gainesville, *Combs* 765a. Cedar Key, *Combs* 766. Homosassa, *Combs* 942. Kissimmee, *Swallen* 246. Hillsborough County, *Fredholm* 6470. Braidentown, *Combs* 1293. Fort Myers, *Hitchcock* 505. Sanibel, *Hitchcock* 2466. Marco, *Hitchcock* 19787. Miami, *Garber* in 1877. Key Largo, *Chase* 3927. Key West, *Rugel* 46, 188. Without locality, *Chapman*; *Rugel* 392, 449.

ALABAMA: Mobile, *Mohr* 21 in 1878, and in 1893.

MISSISSIPPI: Deer Island, *Tracy* 66, 4623. Biloxi, *Tracy* 6466.

LOUISIANA: Point au Barree, *Wurzlów* in 1913.

TEXAS: Galveston, *Nealley* in 1892; *Ward* in 1877. Copano Bay, *Tharp* 1732. Brownsville, *Hitchcock* 2467. Without locality, *Nealley* in 1883.

LOWER CALIFORNIA: San José del Cabo, *Brandegge* 2 in 1890.

TAMAULIPAS: Tampico, *Hitchcock* 5785.

SAN LUIS POTOSÍ: Hacienda de Angostura, *Pringle* 3695. Guascama, *Purpus* 5421.

VERA CRUZ: Vera Cruz, *Hitchcock* 6568.

PUEBLA: Puebla, *Nicolás* in 1908.

GUATEMALA: Izabel, *Blake* 7833. Puerto Barrios, *Standley* 25138.

EL SALVADOR: La Unión, *Hitchcock* 8780.

NICARAGUA: Managua, *Maxon* 7257, 7337. San Juan del Sur, *Hitchcock* 8603.

COSTA RICA: Port Limón, *Hitchcock* 8418; *Pittier* 12697.

PANAMA: Canal Zone, *Hitchcock* 7996, 8034, 8042; *Pittier* 4232; *Standley* 30881.

Old Panama, *Hitchcock* 8403. Punta Poitilla, *Standley* 30799. Río Indio de Fató, *Pittier* 4261.

BERMUDA: *Brown & Britton* 100.

BAHAMAS: Hog Island, *Britton & Brace* 340. Nassau, *Geogr. Soc. Baltimore* 546.

CUBA: Arroyo Mántua, *Ekman* 11003. Habana, *Curtiss* 751; *Ekman* 13392; *Léon* 811. Playa del Rosario, *Roca* 7287. Playa de Marianao, *Palmer & Riley* 848. Tunas, *Léon* 6734. Santiago de Cuba, *Léon & Voisard* 930. Western Cuba, *Wright* 947, 3854.

JAMAICA: Montego Bay, *Hitchcock* 9667. Savanna-la-Mar, *Hitchcock* 9866. Black River, *Hitchcock* 9641. Buff Bay, *Hitchcock* 9775. Gordon Town, *Hart* 860. Kingston, *Amer. Gr. Nat. Herb.* 563; *Harris* 12661.

HAITI: Cap Haitien, *Ekman* H 2756.

PORTO RICO: Mona Island, *Hess* 439. Mayaguez, *Chase* 6307; *Sintenis* 6857. Santurce, *Chase* 6343. Humacao, *Eggers* 691. Island of Vieques, *Chase* 6694.

VIRGIN ISLANDS: St. Croix, *Benzon*; *Paulsen* 313.

LEEWARD ISLANDS: Antigua, *Hitchcock* 16383. Guadeloupe, *Hitchcock* 16409.

- WINDWARD ISLANDS: Martinique, *Duss* 545 in part; *Sieber* 20367. Barbados, *Bot. Station Herb.* 277.
- TRINIDAD: Port of Spain, *Hitchcock* 10050. San Fernando, *Hitchcock* 10108. Cedros, *Hitchcock* 10139.
- TOBAGO: Scarborough, *Broadway* 4655; *Hitchcock* 10287. Studley Park, *Broadway* 3045.
- COLOMBIA: Puerto Colombia, *Hitchcock* 9924. Santa Marta, *Smith* 179.
- VENEZUELA: Paraguana, *Curran & Haman* 569, 578. Paparo, *Pittier* 6317.
- BRITISH GUIANA: Coast region, *Jenman* 4391, 4395, 4522, 4523.
- BRAZIL: Pernambuco, *Chase* 7758. Maceió, *Chase* 7839. Bahia, *Capanema* 5427; *Chase* 8020; *Riedel* in 1831; *Salzmann*. Rio de Janeiro, *Chase* 8221, 8458; *Glaziov* 20122; *Lützelburg* 26; *Matto*s (*Mus. Nac. Rio Jan.*) 16004; *Wilkes Expl. Exped.* Guaratuba, *Dusén* 13783. Porto Dom Pedro II., *Dusén* 13465. Rio Grande do Sul, *Capanema* 5417. Without locality, *Burchell* 1565; *Gardner* 1187; *Riedel* 968.
- URUGUAY: Montevideo, *Herter* 336; *Lombardo* 1786, 1818; *Marchesi* 1749.
- ECUADOR: Balao, *Eggers* 14602.
- PERU: "Callao et Lima," *Didrichsen* 4384.
- ARGENTINA: Buenos Aires, *Goulard* 14.
- FRANCE: Bayonne, *Le Sauvage* in 1856.
- PORTUGAL: Porto, *Buchtien* in 1891.
- FRENCH CONGO: Gabon, *Thollon* 692.
- PORTUGUESE EAST AFRICA: Beira, *Shantz* 366.
- UNION OF SOUTH AFRICA: Durban, *Rudatis* 1564.
- MAURITIUS: *Sieber* 27.
- JAPAN: Oshima, *Faurie* 4474.
- CHINA: Pakhoi, Kwantung, *Hitchcock* 19252. Island of Hainan, *Hitchcock* 19198.
- INDO-CHINA: Haiphong, *Hitchcock* 19542. Bac Ninh, *Jard. Bot. Hanoi* 38. Tourane, *Hitchcock* 19401. Islands of Palo Condor, *Harmand* in 1875-77. "Cochinchina," *Germain*; *Thorel* in 1862-1866.
- FORMOSA: Keelung, *Hitchcock* 18194. Without locality, *Henry* 1036.
- INDIA: "Dakolie," *Prain* in 1902.
- STRAITS SETTLEMENTS: Selangor, Malay Peninsula, *Hort. Bot. Singapore* 4508.
- CEYLON: Negombo, *Alsten* in 1926.
- BORNEO: Without locality, *Beccari* 3528.
- JAVA: Surabaya, *Junghuhn*. Kangean Islands, *Backer* 27676. Madoera, *Backer* 20700.
- PAPUA: Kerema, *Brass* 1229.
- ARU ISLANDS: Dobbo, *Jensen* 222.
- PHILIPPINE ISLANDS: Manila, *Hitchcock* 18034, 18105; *Loher* 1747; *Santos* 12. Pasay, *Merrill* (*Kneucker Gram.*) 805. Los Baños, *Elmer* 18140. Samar, *Merrill* 5229.
- AUSTRALIA: (Queensland) Brisbane River, *Bailey*. (New South Wales), Port Macquarie, *Herb. Bot. Gard. Sydney*.
- NEW ZEALAND: Bay of Islands, *Wilkes Expl. Exped.* Auckland, *Petrie* in 1895. Waitemata, *Kirk* 301.

20. *Paspalum distachyon* Poit.

Paspalum distachyon Poit.; Trin. Mém. Acad. St. Pétersb. VI. Sci., Nat. 1: 142. 1834. Described from a specimen so named by Poiteau, collected, presumably by him, in Santo Domingo. This specimen, said to be in the herbarium of the elder Mertens, now in the herbarium of the Botanical Garden of Leningrad, has not been examined. In the Paris Herbarium is a specimen named "*Paspalum distachyon* locis maritimis. St. Dominique. Poiteau," which is doubtless a duplicate; another is in the Florence Herbarium.

DESCRIPTION

An erect perennial with slender, hard, yellowish rhizomes, forming tough sods, sometimes sparingly stoloniferous; culms 12 to 40 cm. tall, slender, wiry, compressed, often 2 or 3 at a single node of the rhizome; sheaths usually longer than the internodes, keeled, bearing a few hairs on each side of the summit; ligule membranaceous, about 0.3 mm. long; blades 6 to 15 cm. long, 1 to 2 mm. wide, drying involute, mostly erect; racemes 2, 1.2 to 5 cm. long, erect, often closely appressed together, straight; rachis 0.6 to 0.7 mm. wide, triangular, flexuous, the margin scabrous, attenuate at base into a slender peduncle, sometimes with a few hairs at the very base; spikelets solitary on minute puberulent pedicels, scarcely imbricate, 2.8 to 3 mm. long, about 1.2 mm. wide, ovate-lanceolate, acute, pale, greenish; glume and sterile lemma equal, rather firm, 3 to 5 nerved (nerves sometimes strong, sometimes obscure in spikelets in the same raceme); fruit 2.1 mm. long, 1 mm. wide, elliptic, subobtuse, more turgid and firmer in texture than that of *P. vaginatum*.

DISTRIBUTION

Moist or dry, brackish or alkaline soil, mostly near the coast, in the West Indies.

CUBA: Habana, *Léon* 2614, 2783. Cienaga de Zapata, *Léon* & *Loustalot* 9534. Baraguá, *Hitchcock* 23340, 23341. Tiffin, *Shafer* 2874, 2905. Guantánamo, *Hioram* 12. Jamaica, *Hioram* & *Baptiste* 1289. Isle of Pines, *Ekman* 12423.

JAMAICA: Montego Bay, *Hitchcock* 9678. Savanna-la-Mar, *Hitchcock* 9864. Black River, *Harris* 12548; *Hitchcock* 9642. Inverness, *Harris* 11695, 12716.

HAITI: Cap Haitien, *Ekman* H 2749, H 2756. Port-au-Prince, *Buch* 1760.

LEEWARD ISLANDS: Dominica (probably *Poiteau*).



FIGURE 20.—*P. distichum*. From *Hitchcock* 9678

21. *Paspalum distichum* L.

Paspalum distichum L. Syst. Nat. ed. 10. 2: 855. 1759. No citation is given. In the *Pugillus Jamaicensium Plantarum*,⁶⁴ published in November of the same year, this species is described in greater detail. In the preface to this paper it is stated that the plants were collected in Jamaica

by Browne. The specimen in the Linnaean Herbarium is without data. It consists of two culms, one with two, the other with three racemes, and two sterile shoots.

Digitaria paspalodes Michx. Fl. Bor. Amer. 1: 46. 1803. "Hab. in pascuis aridis, juxta Charleston," South Carolina. The type specimen in the Paris Herbarium consists of three fertile specimens each with 2 racemes.

Paspalum digitaria Poir. in Lam. Encycl. Suppl. 4: 316. 1816. "Caroline, aux environs de Charleston (V. s. Comm. Bosc.)." *Digitaria paspalodes* Michx. is cited as synonym. The type has not been examined but the description and Poiret's citation of Michaux's name identify the species.

Milium paspalodes Ell. Bot. S. C. & Ga. 1: 104. 1816. Based on *Digitaria paspalodes* Michx., although the description applies to *Axonopus furcatus* (Flügge) Hitchc. and the figure (pl. 6. f. 2) represents that species.

⁶⁴ Amoen. Acad. 5: 391. 1759.

Milium distichum Muhl. Descr. Gram. 78. 1817. "Habitat in Carolina." No reference is made to *Paspalum distichum* L., but the description agrees with it.

Paspalum michauxianum Kunth, Rév. Gram. 1: 25. 1829. Based on *Digitaria paspalodes* Michx.

Panicum paspaliforme Presl, Rel. Haenk. 1: 296. 1830. "Hab. in Peruviae montanis huanoccensibus." Haenke. The first glume is developed in most of the spikelets of the type specimen in the National Museum at Prague.

Panicum polyrrhizum Presl, Rel. Haenk. 1: 296. 1830. "Hab. ad Monterey Californiae," Haenke. There are two sheets of this collection in the herbarium of the German University at Prague, with the locality given as California. The plants were probably collected on the coast of Lower California, not at Monterey. A minute first glume is present in many of the spikelets.

Paspalum bracteatum Dufour; Kunth, Enum. Pl. 1: 53, 1833, as synonym of *Paspalum michauxianum* Kunth. Dufour's specimen, bearing the name (with a slightly different spelling) is in the DeCandolle Herbarium. It was collected at Bordeaux in 1826 by M. L. Dufour, no. 36.

Panicum digitarioides Rasp.; Kunth, Enum. Pl. 1: 53, 1833, as synonym of *Paspalum michauxianum*. Kunth cites "Bull. de la Soc. Linn. de Bord. 197," but the name is not found in the work cited, nor is there an article by Raspail in it. There is a paper by Des Moulins⁶⁵ on "*Paspalum digitaria* (*Digitaria paspalodes* Michaux)." In a notice of this paper⁶⁶ the name "*Panicum digitariae* Raspail" appears.

Paspalum fernandezianum Colla, Mem. Acad. Sci. Torino 39: 27. pl. 59. 1836. "Vulgo Chepica dictam. * * * legit ipse Berterus in pascuis collium ins Juan Fernandez, et misit cum hac inscriptione in sched. Paspalum a conjugato diversum" (p. 26). On "Bertero 1488, Paspalum a conjugato diversum, vulgo Chepico. In pasc. coll. freq. Ins. Juan fernandez 1830 April" in the Kew Herbarium Munro has written "I have no doubt this is *P. fernandezianum* Colla, described from a plant of Bertero marked 'Paspalum conjugato diversum.'" The specimen is stoloniferous and has pubescent foliage.

Paspalum chepica Steud. Syn. Pl. Glum. 1: 21. 1854. "Paspalum nr. 511 et 1223. Bertero hrbr. Chili Ins. I. Fernand." Bertero's no. 1223, with the name in Steudel's script, is in the Paris Herbarium. The specimen has a long stolon and sparsely pilose foliage.

? *Paspalum oaxacense* Steud. Syn. Pl. Glum. 1: 21. 1854. "Franko legit in Oaxaca." The type has not been located. The description suggests a culm of *P. distichum* without the base and with the racemes approximate instead of paired, such a plant as Palmer's no. 192 in 1896. The first glume is often developed in this species. The name is spelled *P. oajacense* by Hemsley.⁶⁷

Paspalum vaginatum var. *pubescens* Doell in Mart. Fl. Bras. 2²: 75. 1877. "Prope Rio de Janeiro (Glaziou n. 3612)." Doell's specimen of the number cited was not found. This collection in the National Herbarium has spikelets more densely pubescent than usual on the glume and with a stripe of pubescence on the internerves of the sterile lemma.

? *Dimorphostachys? oajacensis* Fourn.; Hemsl. Biol. Centr. Amer. Bot. 3: 499. 1885; Mex. Pl. 2: 16. 1886. Based on *Paspalum oaxacense* Steud., the plant unknown to Fournier.

Paspalum schaffneri Griseb. in Fourn. Mex. Pl. 2: 6. 1886. This name was earlier listed by Hemsley⁶⁸ without description. "Chapultepec * * *

⁶⁵ Bull. Hist. Nat. Soc. Linn. Bordeaux 1: 45. 1826.

⁶⁶ Dierbach, Repert. Bot. 1: 69. 1831.

⁶⁷ Biol. Centr. Amer. Bot. 3: 499. 1885.

⁶⁸ Biol. Centr. Amer. Bot. 3: 482. 1885.

(SCHAFFN. n. 19a); prope San Angel (SCHAFFN. n. 19c); circa Mejico * * * prope Guadalupe, Mirador (SCHAFFN. n. 19b)." The three specimens were examined in the Paris Herbarium; 19a and 19c bear the name in Fournier's script.

Paspalum elliottii S. Wats. in A. Gray, Man. Bot. ed. 6. 629. 1890. Based on *Milium paspalodes* Ell., and like that misapplied to *Axonopus furcatus* (Flügge) Hitchc.

Paspalum paspaloides Scribn. Mem. Torrey Club 5: 29. 1894. Based on *Digitaria paspalodes* Michx., but misapplied to *Axonopus furcatus* as shown by figure 23 in a later work.⁶⁹ Scribner spelled the name "paspaloides." as did Nash under *Anastrophus* (see below).

Panicum digitaria Laterr.; Jacks. Ind. Kew. 3: 412. 1894. Error for *Paspalum digitaria* Poir., as listed in Laterr. Ami des Champs 329. 1825.

Digitaria disticha Fiori & Paoll. Icon. Fl. Ital. Illustr. 1: 16. f. 136. 1895. Presumably based on *Paspalum distichum* since "(L.)" is cited. The figure represents that species.

Anastrophus paspaloides Nash in Britton, Man. 75. 1901. Based on *Paspalum paspaloides* Scribn. but misapplied to *Axonopus furcatus* (Flügge) Nash.

Paspalum distichum var. *digitaria* Hack.; Stuck. Anal. Mus. Nac. Buenos Aires 13: 424. 1906. Based on *P. digitaria* Poir.

Paspalum distichum subsp. *paspalodes* Thell. Mem. Soc. Sci. Nat. Cherbourg 38: 77. 1912. Based on *Digitaria paspalodes* Michx.

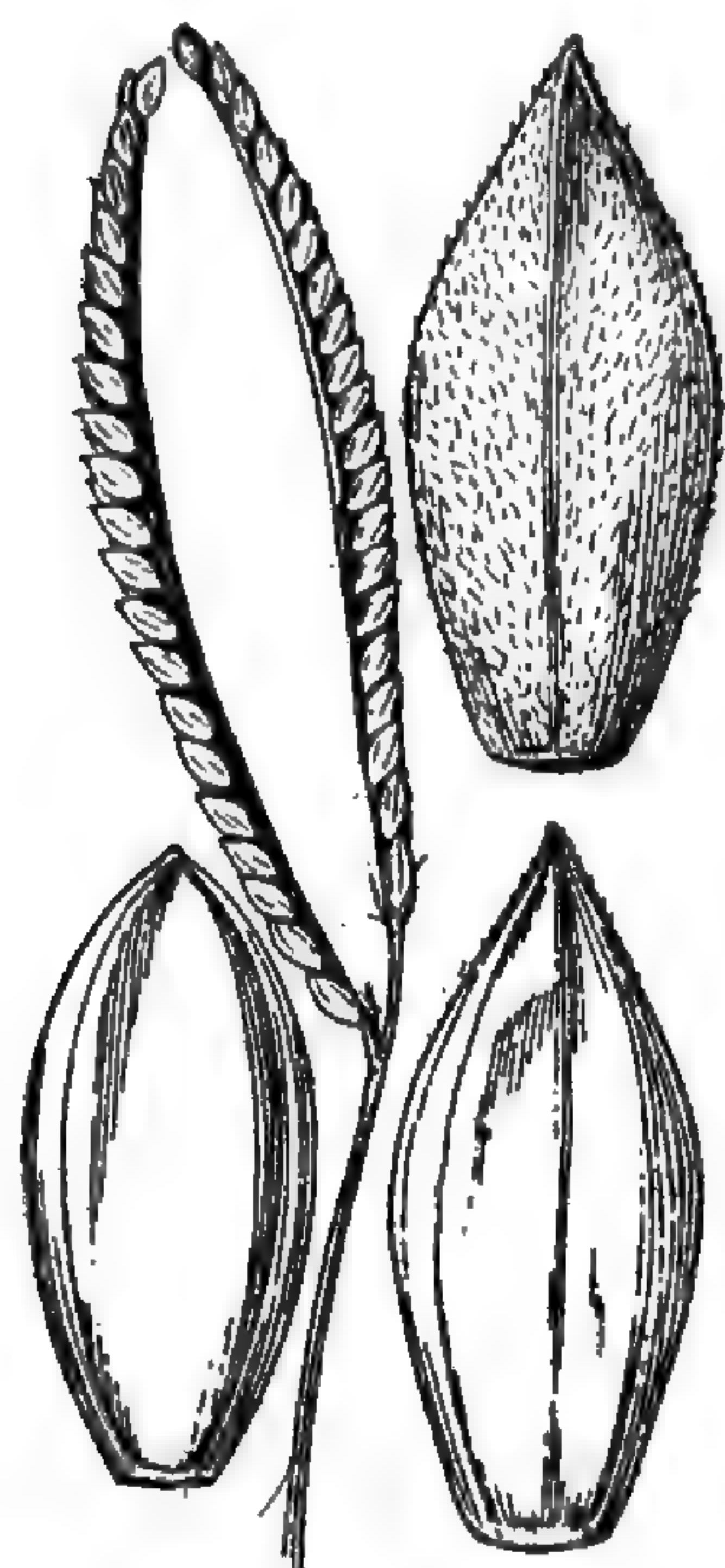


FIGURE 21.—*P. distichum*.
From photograph of type
and Hitchcock 9394

DESCRIPTION

A widely creeping perennial with slender rhizomes, extensively stoloniferous, often forming loose mats, the stolons usually slender, subcompressed, sometimes as much as 1 meter long, the sheaths on the average less loose than in *P. vaginatum*, the blades usually well developed; branches erect or ascending, most of them finally flowering, 6 to 50 cm. tall, often sparingly branching, the culms subcompressed, the dark nodes often with a few ascending hairs; sheaths loose, keeled, commonly pilose on the margin toward the summit; ligule membranaceous, about 0.5 mm. long; blades flat, ascending, 3 to 12 cm. long, 2 to 6 mm. wide at the rounded ciliate base, tapering to an acuminate sometimes involute apex, dull green, relatively soft in texture, occasionally minutely pubescent on the upper surface; peduncles commonly short, often included; racemes usually 2, rarely as many as 4, from erect to reflexed, commonly incurved, 1.5 to 7 cm. long, rarely longer; rachis slightly pedunculate in one, sometimes in both racemes, usually a few long white hairs in the axils, 1 to 1.5 mm., rarely 2 mm. wide, triangular, minutely scabrous on the margin; spikelets solitary (rarely in pairs in the middle of the raceme), imbricate, 2.5 to 3.5 mm., rarely 4 mm. long, 1.3 to 1.5 mm. wide (the variation in size sometimes found in the same plant) elliptic, abruptly acute, pale green; first glume frequently developed; second glume and sterile lemma equal, 3 to 5 nerved, the midnerve relatively prominent, the glume minutely appressed-pubescent, sometimes obscurely so; fruit 2.5 to 2.8 mm. long, about 1.2 mm. wide, elliptic.

⁶⁹ Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 7: 41. 1898.

This is the most variable of the three allied species, sometimes closely resembling *P. vaginatum* but distinguishable by the slightly more turgid spikelets, the glume and sterile lemma not papery, the midnerve evident, the glume at least obscurely pubescent.

Paspalum distichum, known as knotgrass, jointgrass, and Fort Thompson grass, is a valuable soil binder along streams subject to erosion in the Tropics and sub-Tropics. It furnishes excellent grazing in flat regions near the coast. It is sometimes a bad weed in the cotton fields of the Black Belt of Alabama. In the West it is spreading along irrigation ditches and sometimes invades rice fields in California. In Australia it is known as water-couch and siltgrass. It is there regarded as a valuable pasture grass on alluvial flats.

DISTRIBUTION

Ditches and wet, rarely brackish, places, New Jersey to Florida, Tennessee, and Arkansas, and west to California and north along the coast to Washington, south through Mexico and the West Indies to Argentina and Chile; also near warm-temperate coasts of the Eastern Hemisphere.

NEW JERSEY: Camden, *Parker* in 1879.

PENNSYLVANIA: Philadelphia, *Parker* in 1865; *Canby*.

VIRGINIA: Dismal Swamp, *McCarthy*. Virginia Beach, *Kearney* 2028.

NORTH CAROLINA: Ocracoke Island, *Kearney* 2296. Wilmington, *Hitchcock* 400; *Kearney* 279.

SOUTH CAROLINA: Aiken, *Ravenel* in 1882. Orangeburg, *Hitchcock* 18. Georgetown, *Alexander* 157. Without locality, *McCarthy* in 1888.

GEORGIA: Dalton, *Harper* 383. Rome, *Chapman*. Stone Mountain, *Hitchcock* 2431. Augusta, *Hildebrand* in 1921. Albany, *Pollard & Mazon* 527. Ruskin, *Ricker* 902.

FLORIDA: Chipley, *Combs* 539a. Marianna, *Swallen* 499. Quincy, *Combs* 420. Apalachicola, *Kearney* 110. Tallahassee, *Combs* 388. Monticello, *Combs* 317. Jefferson County, *Hitchcock Fl. Pl.* 2469. Madison, *Combs* 241. Madison County, *Hitchcock Fl. Pl.* 2467. Jacksonville, *Combs* 30, 31; *Curtiss* 3567* in part, 4021, 5078, 5741; *Kearney* 135. Baldwin, *Combs* 52. St. Augustine, *Ricker* 947. Gainesville, *Combs* 728. Waldo, *Combs* 710. Eustis, *Chase* 4089; *Hitchcock Fl. Pl.* 2468; *Nash* 1035, 1205. Indian River, *Curtiss* 3567*. Titusville, *Chase* 3961. Homosassa, *Combs* 965. Hillsborough County, *Fredholm* 6380. Bartow, *Combs* 1245. Kissimmee, *Swallen* 271. Braidenton, *Combs* 1272. Sanibel, *Hitchcock* 2432. Fort Myers, *Chase* 4160; *Hitchcock* 506. Dade County, *Small, Mosier & Small* 6893. Key West, *Curtiss* 3567. East Florida, *Palmer* in 1874.

TENNESSEE: Nashville, *Gattinger*. Cumberland River, *Gattinger*. Knoxville, *Kearney* in 1895; *Ruth* 79 and in 1895.

ALABAMA: Selma, *McCarthy* in 1888. Tuskegee, *Carver* 38. Central Alabama, *Mohr* in 1880. Mobile, *Mohr* in 1884.

MISSISSIPPI: Starkville, *Kearney* 12, 93. Agricultural College, *Pollard* 1324. Leake County, *Williams* in 1892.

ARKANSAS: Almyra, *Haskell* in 1911. Pine Bluff, *Hitchcock* 16107. McNab, *Greenman* 4387.

LOUISIANA: Shreveport, *Ball* 103; *Hitchcock* 3901. Alexandria, *Hale*. McCall, *Combs* 1434. Baton Rouge, *Joor* 17. New Orleans, *Drummond* 441; *Joor* 16. Houma, *Wurzlów* in 1913. Pointe-a-la-Hache, *Langlois* in 1884. Cameron, *Cocks* 3009. South Pass, *Tracy & Lloyd* 465.

TEXAS: El Paso, *Hitchcock* 13341; *Jones* in 1885. Western Texas, *Wright* 798. 911, 2093. Fort Davis, *Palmer* 30999. Abilene, *Tracy* 7936. Tom Green County, *Tweedy* in 1880. Fort Worth, *Hitchcock* 3902. Dallas, *Reverchon* 1067.

- Texarkana, *Letterman* in 1894. Austin, *Tharp* in 1921. Comanche Spring, *Lindheimer* 1269. San Antonio, *Ball* 941; *Havard* 6 in 1884; *Hitchcock* 5142. Kerrville, *Hitchcock* 5301. Beaumont, *Plank* 22. Jefferson County, *Plank* 16. Gonzales, *Bogusch* 1487; *Plank* 53. Pierce, *Tracy* 7388. Houston, *Hall* 808; *Thurrow* in 1898. Columbia, *Bush* 294. Rio Grande City, *Griffiths* 6467. Mercedes, *Olive* 9. Corpus Christi, *Hitchcock* 5362. Sarita, *Hitchcock* 5464, 5480. Boquillas, *Swallen* 1117.
- OKLAHOMA: Greer County, *Stevens* 1120. Norman, *Prier* 64.
- WASHINGTON: Kalama, *Leckenby* in 1900. Klickitat County, *Suksdorf* 1612.
- OREGON: Sauvies Island, *Howell* in 1885. Columbia Slough, *Piper* 4200; *Sheldon* 11305. Albina, *Suksdorf* 2981, 3213. Columbia River, *Leckenby* in 1900. Siskiyou National Forest, *Hitchcock* 23538. Sutherlin, *Lawrence* 2095.
- UTAH: St. George, *Cottam* 3388.
- NEVADA: Fallon, *Knight* in 1927.
- NEW MEXICO: Socorro, *Plank* 72; *Vasey* in 1881. Kingston, *Metcalf* 1501. Las Cruces, *Hitchcock* 3903; *Wooton* 1077. Mesilla Valley, *Wooton & Standley* in 1906. Mesilla Park, *Hitchcock* 3821. Queen, *Hitchcock* 13526. Blue Spring, *Tharp* 4147.
- ARIZONA: Fort Verde, *MacDougal* 571. Phoenix, *Peebles, Harrison & Kearney* 230. Tucson, *Griffiths* 1610; *Hitchcock* 3518; *Pringle* in 1881; *Toumey* in 1891 and 1892. Santa Rita Mountains, *Griffiths* 6015. Patagonia, *Hitchcock* 3676, 3677, 3687. San Pedro Valley, *Toumey* in 1894. San Bernardino Ranch, *Mearns* 721, 742, 789, 1979.
- CALIFORNIA: Crescent City, *Davy & Blasdale* 5937. Biggs, *McKee* in 1921. Searsville, *Baker* 1836. Stege, *Suksdorf* 423. Alviso, *Baker* 1699. Yosemite National Park, *Hitchcock* 3211. Santa Cruz, *Anderson* in 1887; *Jones* 2307. Fresno, *Griffiths* 4719. Visalia, *Coville & Funston* 1281. Los Angeles, *Grant* 1196. Westminster, *Abrams* 1762. Laguna Beach, *Crawford* 750. San Pasqual Valley, *Chandler* 5331. San Diego County, *Orcutt* 512a. Without locality, *Rothrock* 59.
- LOWER CALIFORNIA: Santa Agueda, *Palmer* 214 in 1890.
- SONORA: Santa Cruz, *Mearns* 2619. Hermosillo, *Hitchcock* 3575, 3616.
- CHIHUAHUA: Galleana, *Hartman* 659.
- COAHUILA: Saltillo, *Hitchcock* 5587, 5588, 5602; *Palmer* 259 and 391 in 1898.
- SAN LUIS POTOSÍ: Cárdenas, *Hitchcock* 5743. San Luis Potosí, *Hitchcock* 5683, 5748; *Schaffner* 1073.
- ZACATECAS: Zacatecas, *Hitchcock* 7528.
- DURANGO: Torreón, *Hitchcock* 7561. Durango, *Hitchcock* 7568; *Palmer* 192 in 1896.
- JALISCO: Guadalajara, *Hitchcock* 7311. Orozco, *Hitchcock* 7378. Zapotlán, *Hitchcock* 7127.
- AGUASCALIENTES: Aguascalientes, *Hitchcock* 7481, 7487.
- GUANAJUATO: Acámbaro, *Hitchcock* 6944. Irapuato, *Hitchcock* 7415.
- QUERÉTARO: Querétaro, *Hitchcock* 5815, 5837.
- HIDALGO: Pachuca, *Hitchcock* 6768.
- VERA CRUZ: Orizaba, *Hitchcock* 6312, 6314; *Pringle* 7532. Córdoba, *Hitchcock* 6400. Jalapa, *Hitchcock* 6647, 6652. Vera Cruz, *Hitchcock* 6561.
- PUEBLA: Tehuacán, *Hitchcock* 6044, 6066. Chalchicomula, *Hitchcock* 6291. Puebla, *Arsène* 333, 1601; *Nicolas* 5410. Mt. Orizaba, *Seaton* 61.
- MEXICO: Federal District, *Arsène* 8831; *Bourgeau* 532; *Hitchcock* 5884; *Lyonnet* 49; *Pringle* 6780. Toluca, *Hitchcock* 6910.
- MORELOS: Cuernavaca, *Hitchcock* 6844.
- MICHOACÁN: Morelia, *Arsène* 3362. Rincón, *Arsène* in 1909.

- OAXACA: Tomellín, *Hitchcock* 6225. Oaxaca, *Hitchcock* 6173.
- GUATEMALA: San Marcos, *Lehmann* 1571. La Aurora, *Morales* 700.
- COSTA RICA: San José, *Hitchcock* 8495; *Jiménez* 927; *Pittier* 306. Tres Ríos, *Pittier* 4329. Tuis, *Tonduz* 11395. Alajuelita, *Tonduz* 8822.
- BERMUDA: Harrington Sound, *Brown & Britton* 826.
- BAHAMAS: New Providence, *Britton & Brace* 513. Watling Island, *Geogr. Soc. Baltimore* 479.
- CUBA: San Diego de los Baños, *Léon* 4413. Herradura, *Tracy* 9056. Western Cuba, *Wright* 1546. Habana, *Curtiss* 764; *Léon* 929, 940, 1992, 6204. Marianao, *Léon* 12457. Hoyo Colorado, *Léon* 7537. Puentes Grandes, *Ekman* 504; *Léon* 1991. Batabanó, *Ekman* 888. Santiago de las Vegas, *Baker & Wilson*, 385. Guanabacoa, *Léon* 2642. Sancti Spiritus, *Léon* 941. Without locality, *Wright* 292 in part.
- JAMAICA: Shettlewood, *Harris* 11645. Ipswich, *Hitchcock* 9593. Ewarton, *Hitchcock* 9454. Spanish Town, *Hitchcock* 9287. Castleton Gardens, *Harris* 12528; *Hitchcock* 9389, 9394. Mt. Hybla, *Harris* 11850. Gordon Town, *Hart* 865. Troy, *Harris* 12568.
- HAITI: Marmelade, *Leonard* 8416. Mirabalais, *Cook, Scofield & Doyle* 91. Pétionville, *Leonard* 5059. Jacmel, *Ekman* H 7086.
- DOMINICAN REPUBLIC: Haina, *Faris* 388. San Cristóbal, *Faris* 258.
- PORTO RICO: Maricao, *Chase* 6233. Hato Grande, *Sintenis* 2715. Canóvanas, *Stevenson* 5389. Ponce, *Chase* 6483, 6494. Fajardo, *Sintenis* 1720. Island of Vieques, *Chase* 6690.
- VIRGIN ISLANDS: St. Croix, *Hitchcock* 16326; *Ricksecker* 433; *Thompson* 23, 242. Tortola, *Fishlock* 436.
- LEEWARD ISLANDS: Antigua, *Hitchcock* 16397. Guadeloupe, *Duss* 3609.
- WINDWARD ISLANDS: Martinique, *Duss* 545; *Husnot* 74. St. Lucia, *Glasgow* 9; *Kemp* 47, 56; *Moore* 18. St. Vincent, *McRae*. Grenada, *Broadway* 1793.
- TRINIDAD: San Fernando, *Broadway* 6353. Pitch Lake, *Hitchcock* 10086.
- TOBAGO: Cullodon, *Broadway* 4513. Plymouth, *Hitchcock* 10283.
- COLOMBIA: Buenaventura, *Hitchcock* 19908. Santa Marta, *Smith* 2159.
- BRITISH GUIANA: Georgetown, *Hitchcock* 16563. Coast region, *Jenman* 3962, 4520, 4586.
- DUTCH GUIANA: Paramaribo, *Kuyper* in 1913. "Surinam," *Weigelt*.
- BRAZIL: Bello Jardim, *Chase* 7701. Bahia, *Chase* 8037. Serra de Itatiaia, *Chase* 8258. Ouro Preto, *Chase* 9333. Lavras, *Chase* 8752. Rio Pardo, *Jürgens* 49. Without locality, *Capanema* 5418.
- PARAGUAY: Ypacaray, *Hassler* 12452. Río Pilcomayo, *Rojas* 322.
- URUGUAY: Montevideo, *Arechavaleta* 201; *Lombardo* 1813. Nueva Palmira, *Herter (Herb. Osten)* 18826. Palleros, *Herter (Herb. Osten)* 18621.
- ECUADOR: Ibarra, *Sodirol* in 1888. Pomasqui, *Sodirol* in 1897.
- PERU: Chosica, *Holway* 781.
- BOLIVIA: La Paz, *Buchtien* 4518. Cotaña, *Buchtien* 3126. San José, *Hitchcock* 22730. Cochabamba, *Hitchcock* 22793. Arque, *Hitchcock* 22790. Oploca, *Hitchcock* 22882. Tarija, *Fries* 1064. Río Suturú, *Steinbach* 6835. Without locality, *Bang* 1312.
- ARGENTINA: Prov. Catamarca, *Jørgensen* 1150. Formosa, *Jørgensen* 3298; *Parodi* 8318. Pergamino, *Parodi* 3993. General Alvear, *Parodi* 8. General Roca, *Fischer* 257.
- CHILE: Santiago, *Claude Joseph* 2270; *Hastings* 316; *Philippi* in 1888. Panguipulli, *Claude Joseph* 2640a. Rauco, *Claude Joseph* 4718. Bureo, *Claude Joseph* 4146. Termas de Chillan, *Holway* in 1919.
- HAWAIIAN ISLANDS: Honolulu, *Andersson* 8 in 1852; *Hitchcock* 13803.

FRANCE: Garonne River, *Arnaud* in 1885. Bordeaux, *Motelay* in 1870. Biarritz, *Blanchet* 230. Beziers, *Sennez* in 1891.

ITALY: Genoa, *Canepa*.

UNITED SOCIALIST SOVIET REPUBLICS: (Transcaucasia) Abchasien, *Woronow* in 1902. Suchum Kale, *Marcowicz* (*Kneucker Gram.*) 482.

UNION OF SOUTH AFRICA: Pretoria, *Nat. Herb.* 19604.

INDIA: Gwalior, *Maries* 19.

CHINA: Shanghai, *Hitchcock* 18580. Canton, *Hitchcock* 18702.

FORMOSA: Taihoku, *Sasaki* 21388.

INDO-CHINA: Hanoi, *Hitchcock* 19485, 19487. Without locality, *Petelot* 20.

AUSTRALIA: South Perth, *Carne* 117. Sydney, *Black* 33. *Hamilton* in 1909. Scone, *White* 44.

NEW ZEALAND: Wellington, *Travers* in 1909.

22. *Paspalum paucispicatum* Vasey

Paspalum paucispicatum Vasey, Contr. U. S. Nat. Herb. 1: 281. 1893. "Collected at Guadalajara [Mexico] by Dr. Edward Palmer (no. 243) in 1886." The type specimen in the United States National Herbarium consists of two plants, one bearing 2, the other 3, racemes. The nodes are less pubescent than usual in this species.

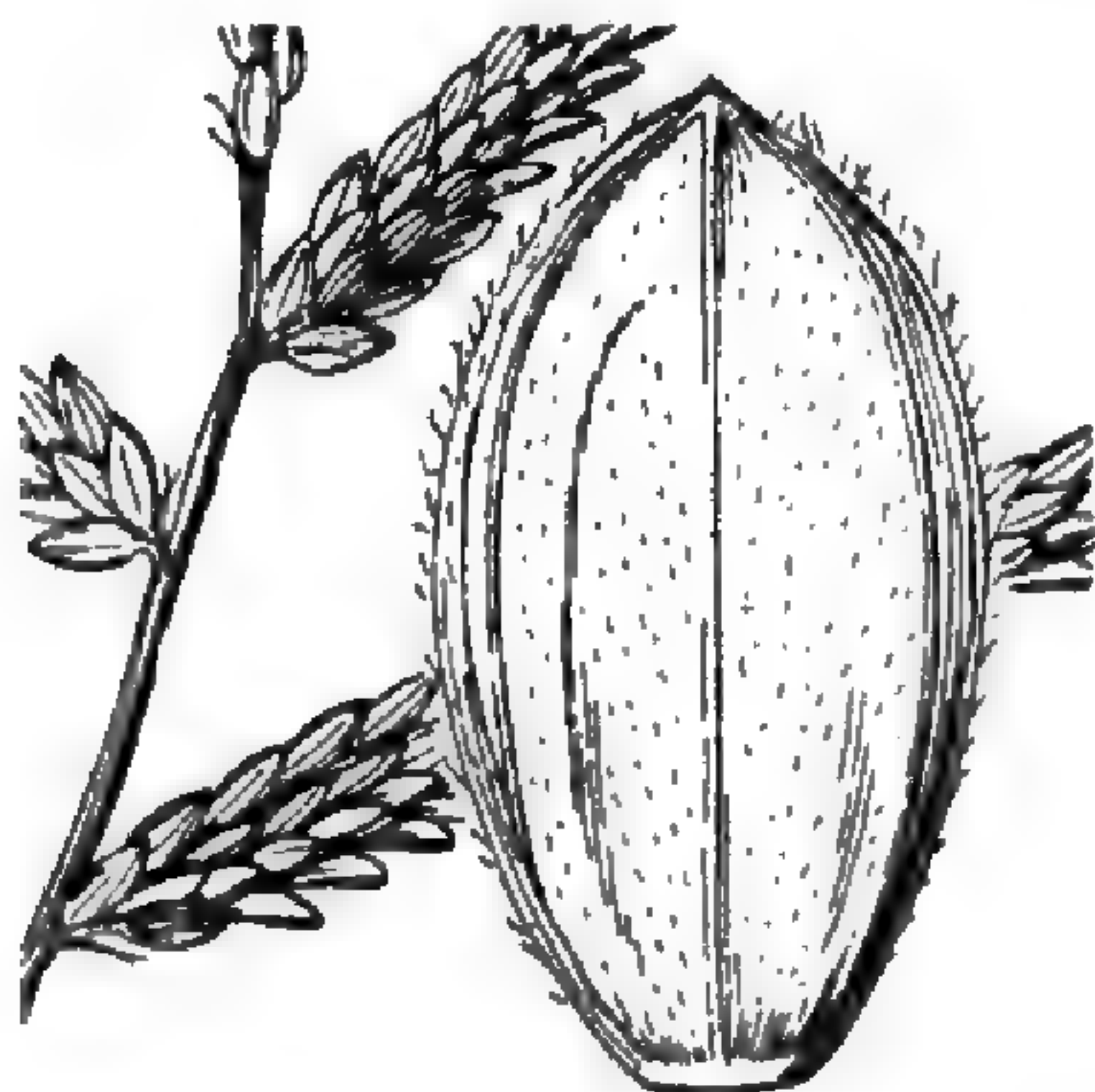


FIGURE 22.—*P. paucispicatum*.
From *Hitchcock* 3615

DESCRIPTION

Similar to vigorous specimens of *P. distichum*, the nodes usually more densely pilose, the ligule about 1 mm. long; racemes 2 to 5, mostly 3, the upper two conjugate, the others 5 to 10 mm. distant; spikelets mostly in pairs, crowded, 3 to 3.5 mm. long, the sterile lemma as well as the glume usually pubescent but minutely so.

The inflorescence of 3 to 5 thick racemes with spikelets in pairs appears very different from that of *P. distichum*, but several Mexican specimens appear to be intermediate between the two; for example, *Hitchcock* 5683, 6168, and 7311, referred to *P. distichum*, and *Arsène* 10268, *Palmer* 693 and some specimens of *Palmer* 243, the type collection of *P. paucispicatum*, referred to *P. paucispicatum*. This might perhaps better be regarded as a variety of *P. distichum*, but the resulting name would be misleading.

DISTRIBUTION

Moist sand or mud in arid regions, southern California and Mexico.

CALIFORNIA: "Southern California," *Palmer* in 1888.

SONORA: Hermosillo, *Hitchcock* 3615. Yaqui River, *Palmer* 16 in 1869. Guaymas, *Palmer* 243 in 1886.

CHIHUAHUA: Miñaca, *Hitchcock* 7735.

NUEVO LEÓN: Monterrey, *Hitchcock* 5522, 5552, 5575.

JALISCO: Guadalajara, *Palmer* 243 in 1886.

QUERETARO: Queretaro, *Arsène*⁷⁰ 10268.

OAXACA: Oaxaca, *Hitchcock* 6168.

⁷⁰ Brother *Arsène* has distributed occasional collections of Brother *Abbon*, Brother *Agniel*, Brother *Nil*, and others. The name of the collector is given on the label, often in parentheses, but the printed label and serial number are those of Brother *Arsène*. These specimens are therefore cited as *Arsène's*.

Livida.—Perennials with compressed culms; blades mostly flat; spikelets 2 to 3.1 mm. long. Scarcely a natural group.

Spikelets turgidly plano-convex, 3 to 3.2 mm. long. Culms rather stout.

Spikelets pubescent.....23. *P. pubiflorum*.

Spikelets glabrous.....23a. *P. pubiflorum glabrum*.

Spikelets depressed plano-convex or slightly concavo-convex.

Spikelets and rachis pale. Spikelets pointed, at least the glume pubescent.

Blades rather lax.....25. *P. hartwegianum*.

Blades firm, subinvolute, the margins very scabrous----26. *P. alcalinum*.

Spikelets and usually the rachis stained with lurid purple or bronze.

Panicle axis very slender, flexuous; spikelets 2 to 2.5 mm. long, usually minutely apiculate.....24. *P. lividum*.

Panicle axis slender but straight; spikelets 2.5 to 3 mm. long, not apiculate.

Spikelets elliptic, about 1.3 mm. wide. Racemes relatively slender.

27. *P. crinitum*.

Spikelets elliptic-obovate; about 1.8 mm. wide.

Spikelets 2 mm. long; culms not more than 50 cm. tall.

28. *P. mutabile*.

Spikelets 2.8 to 3.1 mm. long; culms 60 to 150 cm. tall.

Rachis 1.5 to 2 mm. wide; racemes 9 to 20; spikelets plano-convex.

29. *P. tinctum*.

Rachis 1.2 to 1.4 mm. wide; racemes 4 to 10; spikelets slightly concavo-convex.....30. *P. arsenei*

23. *Paspalum pubiflorum* Rupr.

Paspalum planifolium Fourn. Mex. Pl. 2: 10. 1886. "San Luis de Potosi (VIRL. absque n.); Orizaba (F. MÜLL.) n. 2062 in herb Petrop." The name was earlier listed without description by Hemsley.⁷¹ The Virlet specimen in the Paris Herbarium, bearing the name in Fournier's script, consists of three fragments with overmature panicles. The spikelets are very minutely pubescent. Müller's no. 2062 in Kew Herbarium is a specimen of *P. lividum*. The one in Leningrad has not been examined. Although *P. planifolium* appears on the page preceding that on which *P. pubiflorum* is published it has no priority in time, and the name is not taken up because the fragmentary type is less characteristic of the species than is the type of *P. pubiflorum* and because the latter name has come into use, while the former has not. In the only subsequent work in which *P. planifolium* appears⁷² the name is misapplied to *Paspalum botterii*.

Paspalum pubiflorum Rupr.; Fourn. Mex. Pl. 2: 11. 1886. "Tehuacan de las Granadas * * * (GAL. n. 5747)." The name was listed without description by Ruprecht⁷³ and by Hemsley.⁷⁴ The type specimen, collected by Galeotti, was examined in the Brussels Herbarium.

Paspalum pubiflorum var. *viride* Fourn. Mex. Pl. 2: 11. 1886. "San Luis de Potosi (VIRL. n. 1328)." This was listed without description by Hemsley.⁷⁵ Virlet's no. 1328 in the Brussels Herbarium is named "*Paspalum pubiflorum*" in Fournier's script. The varietal name does not appear. The plant is typical *P. pubiflorum*.

⁷¹ Biol. Centr. Amer. Bot. 3: 481. 1885.

⁷² Chase in Hitchc. Contr. U. S. Nat. Herb. 17: 234. 1913.

⁷³ Bull. Acad. Brux. 9: 237. 1842.

⁷⁴ Biol. Centr. Amer. Bot. 3: 481. 1885.

⁷⁵ Biol. Centr. Amer. Bot. 3: 481. 1885.

Paspalum hallii Vasey & Scribn. Bull. Torrey Club 13: 165, 1886, as synonym of "*P. remotum* Remy?" The description is drawn from "E. Hall, 804 Texas." This specimen, in the United States National Herbarium, is labeled "*Paspalum remotum* Remy fide Munro" and bears diagnosis and notes in Vasey's hand expressing doubt of the accuracy of the identification. The lowest raceme of one plant is 9 cm. below the next above, in the other three plants it is approximate.

Paspalum remotum var. *glaucum* Scribn. in Vasey, Bull. Torrey Club 13: 165, 1886. No specimen is cited. In the United States National Herbarium is a somewhat glaucous specimen bearing this name in Scribner's writing. It was collected by V. Havard in Grapevine Canyon, Western Texas, in September, 1883.

Paspalum pubiflorum var. *glaucum* Scribn. Contr. U. S. Nat. Herb. 3: 19, 1892. "Southwestern Texas and Mexico * * * (Dr. Havard & C. G. Pringle)." The type specimen of *P. remotum glaucum* bears the changed name in Scribner's script.

This species has been referred to *P. remotum* Remy, on the basis of an identification by Munro of Hall 804 as *P. remotum*. The type of *P. remotum* or part of it, from Bolivia,⁷⁶ with the name in Munro's script, was examined in the Oxford Herbarium. It is not known from North America.

DESCRIPTION

A glaucous to olivaceous perennial, decumbent at base, often rooting at the nodes and bearing erect flowering branches, the internodes of the decumbent part short, the nodes swollen; culms rather robust, 40 cm. to 1 meter long, ascending or erect from the decumbent base, compressed, often sulcate in drying, glabrous, the ascending part simple or bearing a few leafy shoots, rarely a flowering branch; nodes dark, at least the lower pilose;

sheaths mostly shorter than the internodes, rather loose, at least the lower sparsely papillose-pilose, the margins membranaceous, brown; ligule 1 to 3 mm. long; blades flat, rather lax, 6 to 25 cm. long, commonly 10 to 15 cm. long (the uppermost reduced), 6 to 14 mm. wide, acuminate, usually with a few stiff hairs at the rounded base, otherwise glabrous, the margin scabrous, rarely ciliate toward the base; racemes 2 to 8, usually 3 to 5, the lowest sometimes distant, 2 to 10 cm. long, rather thick, from erect to horizontally spreading, a tuft of long white hairs in the axils; rachis 1.2 to 2 mm. wide, green, glabrous, scabrous on the margins, the lowest often naked at base; spikelets in pairs, rarely solitary, usually crowded, 3 to 3.2 mm. long, about 2 mm. wide, obovate, rather turgid, obtuse, yellowish green or sometimes purplish; second glume and sterile lemma

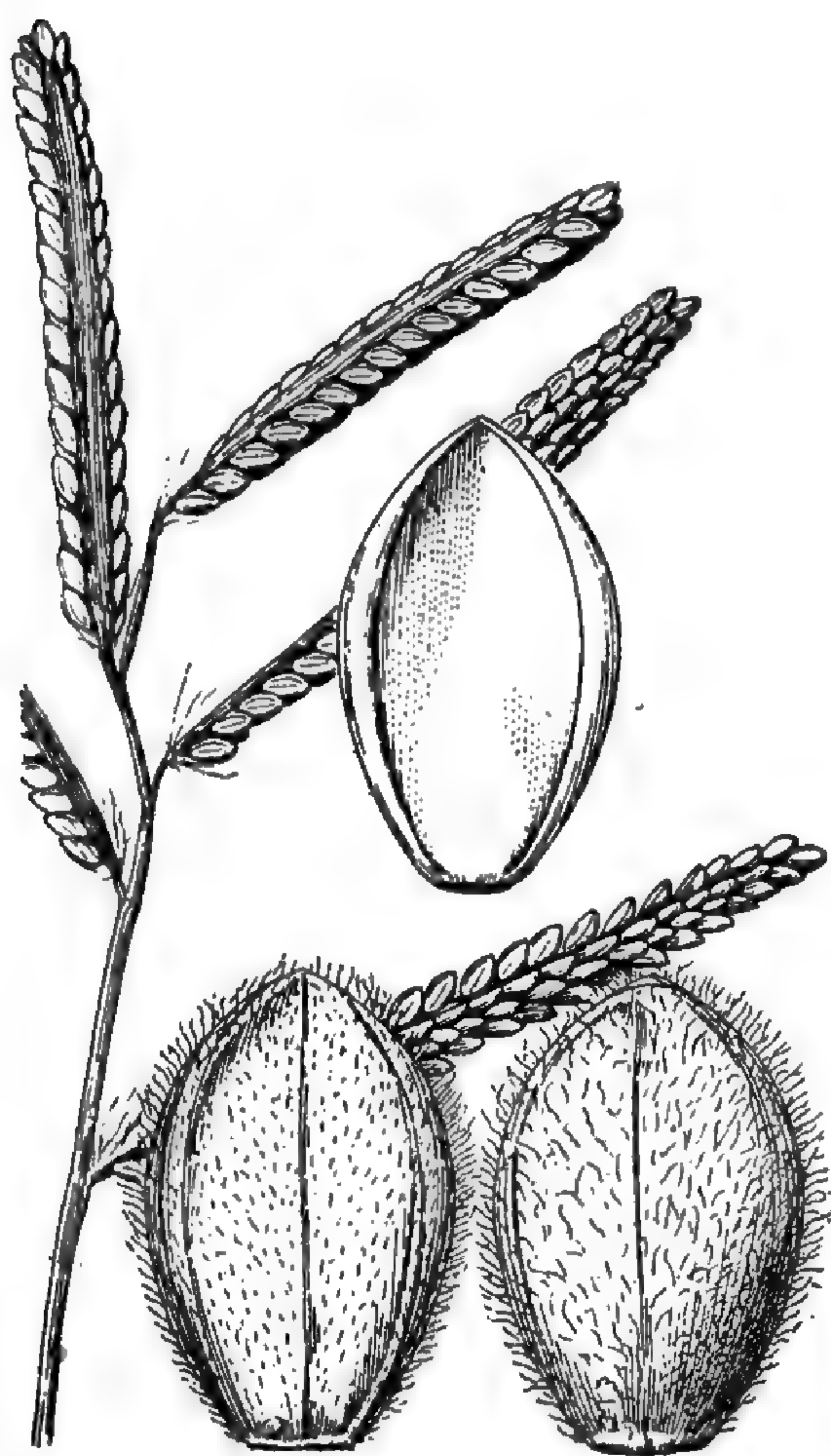


FIGURE 23.—*P. pubiflorum*. From type specimen and Hitchcock 5555

⁷⁶ See Contr. U. S. Nat. Herb. 24: 453. 1927.

subequal, 3 to 5 nerved, the glume softly pubescent with spreading hairs, the sterile lemma minutely appressed-pubescent; fruit pale, about 3 mm. long and 1.9 mm. wide, minutely striate-roughened.

Occasional plants have slightly smaller spikelets. Rarely, as in *Hitchcock* 5608, and *Holway* 3416, the blades are sparsely pilose on the lower surface. A specimen collected by Brother Arsène in Morelia, Mexico, in 1909, and *Léon* 1968 have spikelets only obscurely pubescent, as in the type of *P. planifolium* Fourn.

DISTRIBUTION

Moist open ground, banks, low woods, along streams and irrigation ditches, especially in alkaline clay soil, Louisiana and Texas, throughout Mexico, up to 2,000 meters altitude; also in western Cuba.

LOUISIANA: Alexandria, *Ball* 179, 496. Natchitoches, *Ball* 148. Without locality, *Hale*.

TEXAS: Choctaw, *Hitchcock* 2468. Fort Worth, *Hitchcock* 16141; *Ruth* 134, 300. Tarrant County, *Ruth* 761. Dallas, *Reverchon* 2217 A and in 1877. Weatherford, *Tracy* 7938. Kerrville, *Heller* 1872; *Hitchcock* 5260, 5296; *Smith* in 1897. Burnet, *Plank* 40. Brazos County, *Nealley* 92. Austin, *Hall*; *Tharp* 1293, 1294. Oak Hill, *Tharp* 2005. New Braunfels, *Hitchcock* 5198. Waller County, *Thurrow* in 1898. San Antonio, *Ball* 939; *Heller* 1699; *Hitchcock* 3904, 5146, 5254. Bexar County, *Jermy* 8. North Galveston, *Hitchcock* 2469. Rutersville, *Wright*. La Grange, *Richards* in 1883. Pierce, *Piper* in 1921; *Tracy* 7406. Port Lavaca, *Tharp* 1748. Kingsville, *Tracy* 8887. Eagle Pass, *Havard*. Del Rio, *Hitchcock* 13653, 13657. Grapevine Canyon, west of Terlingua River, *Havard* in 1883. Without locality, *Buckley* in 1883; *Drummond* 342; *Hall* 804; *Lindheimer* 567; *Nealley* in 1886 and 1889.

LOWER CALIFORNIA: Maleje, *Palmer* 45 in 1887.

SONORA: Hermosillo, *Hitchcock* 3600, 3623; *Maltby* 242. Guaymas, *Palmer* 79 in 1887.

CHIHUAHUA: Chihuahua, *Kurtz* in 1885; *Pringle* 374.

COAHUILA: Saltillo, *Hitchcock* 5590, 5608. Sabinas, *Nelson* 6832. Jimulco Springs, *Pringle* 427.

NUEVO LEÓN: Monterrey, *Hitchcock* 5549, 5555, 5563, 5572.

TAMAULIPAS: Victoria, *Palmer* 261 and 395 in 1907.

SAN LUIS POTOSÍ: Cárdenas, *Hitchcock* 5735.

DURANGO: Durango, *Hitchcock* 7578; *Palmer* 871 in 1896.

JALISCO: San Nicolás, *Hitchcock* 7196, 7220, 7230. Chapala, *Holway* 3416. Colotlán, *Rose* 3602.

GUANAJUATO: Irapuato, *Hitchcock* 7414. Acámbaro, *Hitchcock* 6948, 6950.

QUERÉTARO: Querétaro, *Arsène*, 10348; *Basile* 34, 35; *Hitchcock* 5811.

PUEBLA: Tehuacán, *Hitchcock* 6059; *Pringle* 7537; *Seler* 5.

MICHOACÁN: Morelia, *Arsène* 2805.

GUERRERO: Santa Fé, *Hitchcock* 6686.

OAXACA: Valley of Oaxaca, *Conzatti & González* 350.

CUBA: Habana, *Amer. Gr. Nat. Herb.* 908. *Ekman* 10, 16800; *Léon* 1986. Cerro, *Ekman* 938.

23a. *Paspalum pubiflorum glabrum* Vasey

Paspalum remotum var. *glabrum* Vasey, Bull. Torrey Club 13: 166. 1886. No specimen is cited but in the National Herbarium is a specimen collected by A. B. Langlois (no. 26) in Plaquemines County, La., in 1883, which bears the name in Vasey's script. It is a tall plant without the base.

Paspalum pubiflorum glabrum Vasey; Scribn. Bull. Tenn. Exp. Sta. 7: 32. pl. 5. f. 18. 1894. "Found by the writer [Scribner] * * * at Belle Meade, near Nashville, July, 1892, and Dr. Gattinger collected it in the same region in July, 1886. Mr. S. M. Bain collected it in Lake County, near the Mississippi, June, 1893." The specimen collected by Scribner at Belle Meade, now in the National Herbarium, is the original of figure 18, hence is taken as the type. It has a

decumbent base, rooting at the nodes. Vasey's earlier name is not cited.

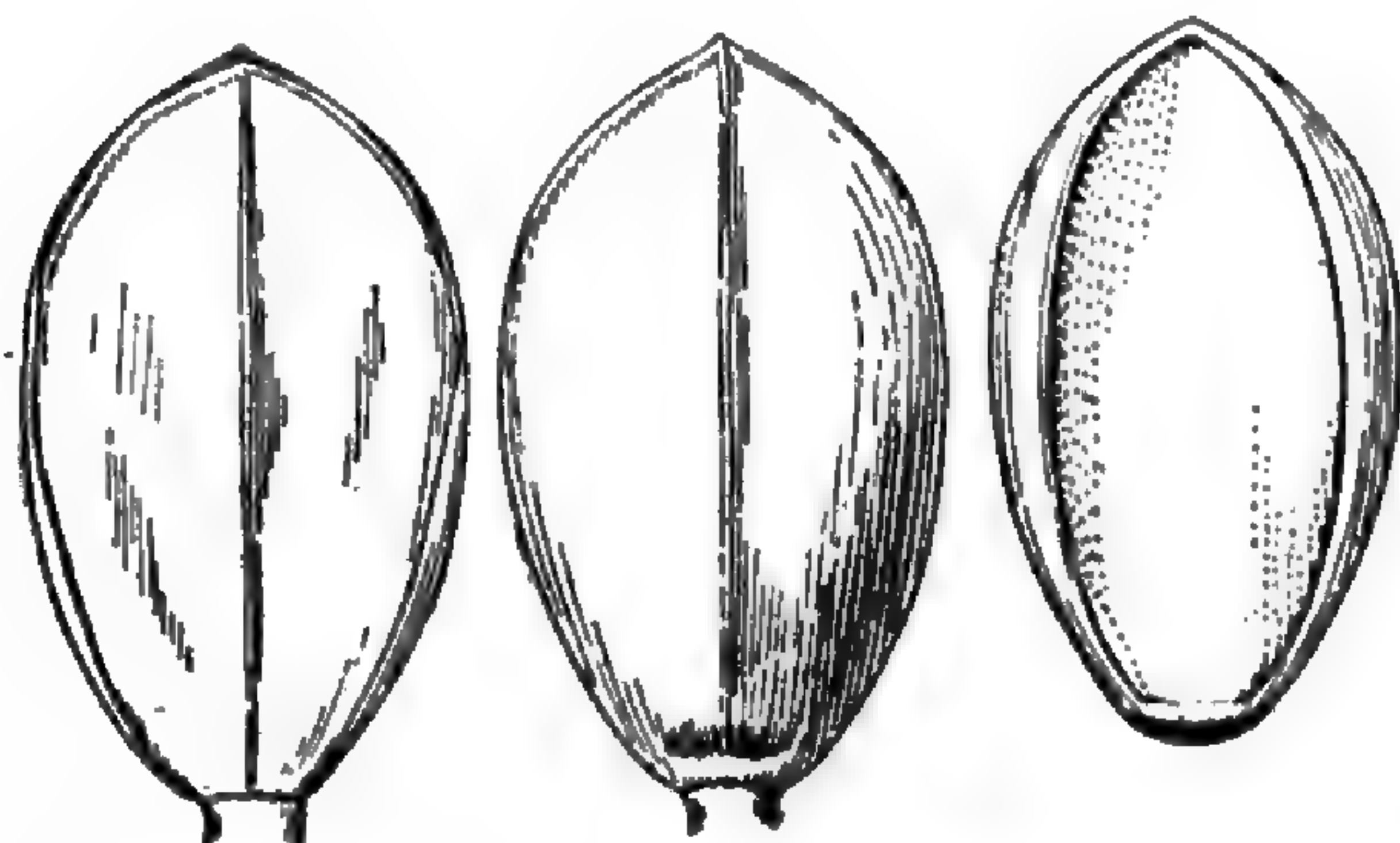


FIGURE 24.—*P. pubiflorum glabrum*. From type specimen

Paspalum geminum Nash, Bull. N. Y. Bot. Gard. 1: 434. 1900. "In clay soil, Florida. Type collected by the writer [G. V. Nash] at Eustis, Lake Co., May 1-15, 1894, no. 680." In this specimen, in the herbarium of the New York Botanical Garden, the culm is geniculate at base but not rooting at the nodes, the blades are rather firm and folded.

Paspalum laeviglume Scribn.; Nash in Small, Fl. Southeast. U. S. 75, 1326. 1903. Based on *P. remotum* var. *glabrum* Vasey. Not *P. glabrum* Gaud. 1811.

DESCRIPTION

Plants of the same habit as *P. pubiflorum*, on the average more robust, in rich ground the culms sometimes 2 meters long, the sheaths less pilose, the blades a little wider (occasionally to 2 cm. wide) and tapering toward the base, the racemes commonly longer and oftener more than five; spikelets glabrous.

In a few specimens the spikelets are obscurely pubescent on the glume.

Paspalum pubiflorum glabrum is a palatable pasture grass and very drought-resistant.

DISTRIBUTION

Moist low open ground, woods and ditch banks, North Carolina and Kentucky to Florida and west to Kansas and Texas.

INDIANA: Vollmer, *Deam* 32940. Mt. Vernon, *Riecken* 19.

ILLINOIS: Mound City, *Bock & Chase* 145. Cairo, *Bock & Chase* 147, 150.

MISSOURI: Carthage, *Palmer* 967, 2334. Swan, *Bush* 432, 3393. Butler County, *Bush* 3711. Dunklin County, *Eggert* 257.

KANSAS: Labette County, *Hitchcock* in 1899.

NORTH CAROLINA: Without locality, *Vasey* in 1878.

SOUTH CAROLINA: Oconee County, *Anderson* 1524, 1540. Clemson College, *House* 2863.

FLORIDA: Marianna, *Swallen* 547. Jacksonville, *Kearney* 154b. Eustis, *Nash* 680. Orange Bend, *Chase* 4093, 4108.

KENTUCKY: Wickliffe, *McFarland & Anderson* 255, 341. Camp Nelson, *McFarland* 158. Henderson, *McFarland & Anderson* 326; *Towles* in 1899.

TENNESSEE: Lake County, *Bain* 175. Nashville, *Gattinger* in 1867, 1878, 1879, and 1886. Knoxville, *Ruth* 82. West Knoxville, *Ruth* in 1895. Cocke County, *Kearney* 946.

MISSISSIPPI: Starkville, *Chase* 4440; *Kearney* 54, 85; *Tracy* 97.

ARKANSAS: Jefferson County, *Eggert* in 1896. Fulton, *Bush* 978. Fort Smith, *Bigelow*.

LOUISIANA: Alexandria, *Hale*. Shreveport, *Ball* 108. Natchitoches, *Ball* 147. Burnside, *Combs* 1405. Plaquemines County, *Langlois* in 1880. Without locality, *Hale* 25.

TEXAS: Dallas, *Reverchon* 85, 2217. Weatherford, *Tracy* 8231.

OKLAHOMA: Perkins, *Featherly* in 1925. Between Fort Cobb and Fort Arbuckle, *Palmer* 369 in 1868.

24. *Paspalum lividum* Trin.

Paspalum lividum Trin. in Schlecht. *Linnaea* 26: 383. 1854. "Ad Hacienda de la Laguna [Mexico] Jul., leg. Dr. Schiede." The type specimen, in the Trinius Herbarium, was examined by A. S. Hitchcock. The spikelets are 2 to 2.2 mm. long and dark purplish green. Other specimens of the same collection were examined by the author in the Delessert and Paris herbaria and in the British Museum. They are all small plants, like *Hitchcock* 7318, the culms 20 to 25 cm. tall. The Delessert specimen shows a decumbent base.

This species has been referred⁷⁷ to *P. denticulatum* Trin., a Brazilian species to which it is very closely related. The type specimen of *P. lividum* was referred by Trinius himself in his herbarium to *P. denticulatum*. Recent collections from Brazil show the two to be distinct.

DESCRIPTION

A glabrous perennial, the culms solitary or few in a tuft, compressed, ascending, the lower part decumbent, branching and often rooting at the nodes, sometimes creeping 1 meter or more, the ascending part 0.5 to 1 meter tall, simple or bearing a few sterile branches; sheaths keeled, rather loose, usually overlapping, the margin hyaline, sometimes pilose, especially toward the summit; ligule 1 to 2 mm. long; blades laxly ascending, usually conduplicate at base, narrower at the base than the summit of the sheath, commonly 15 to 25 cm. long, 3 to 6 mm. wide, sometimes obscurely pubescent on the upper surface; racemes 3 to 10, commonly 4 to 7, usually distant about half their own length on a very slender, flexuous axis, commonly 1.5 to 5 cm. long, mostly thick and densely flowered, usually ascending and flexuous, and with a few long delicate hairs in the axils, the lower sometimes on slender peduncles; rachis 1.5 to 2 mm. wide, dark livid purple, usually with a few long hairs scattered on the margin; spikelets normally in pairs, 2 to 2.5 mm. long, 1.3 to 1.5 mm. wide, obovate; second glume and sterile lemma equal, often minutely apiculate, delicate in texture, usually blotched with livid purple, occasionally yellowish green, 3-nerved; fruit 2 to 2.3 mm. long, about 1.2 mm. wide, elliptic, very minutely striate-roughened.

Rarely the spikelets are softly pubescent around the margin, and less rarely the sheaths are pilose, but on the whole the species is well marked. The heavy lurid flexuous racemes on the almost filiform axis are particularly characteristic.

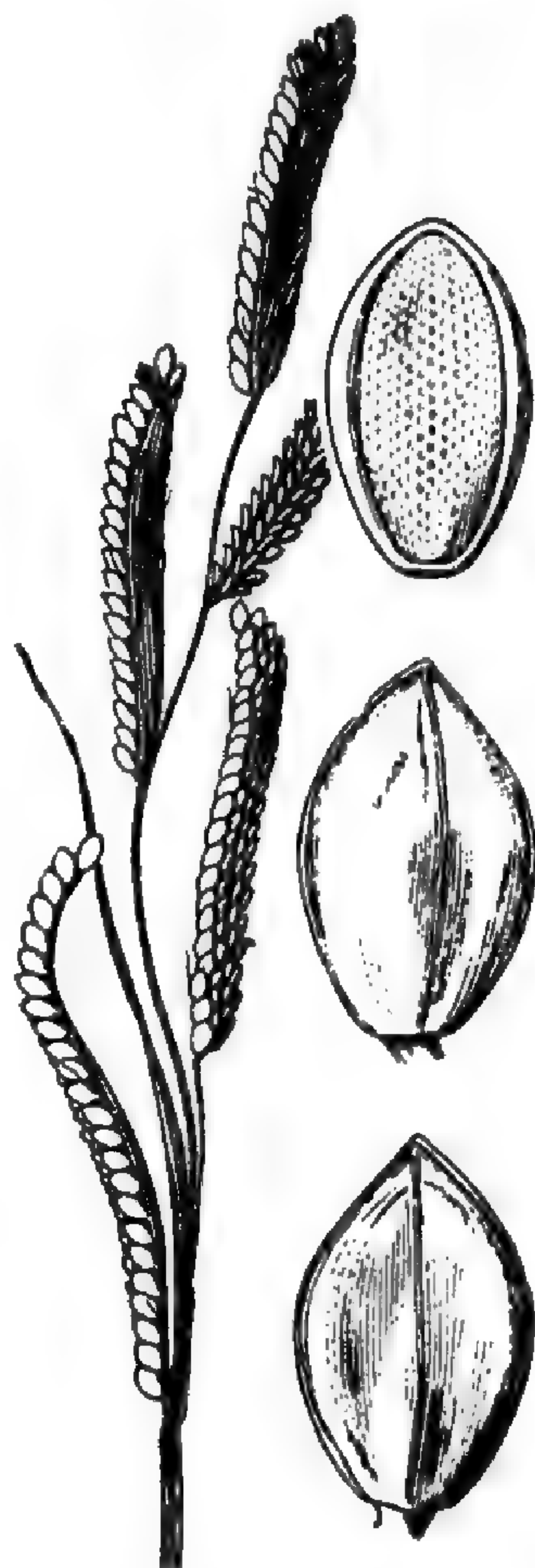


FIGURE 25.—*P. lividum*.
From type specimen and
Arsène 3176

⁷⁷ Hitchc. & Chase, *Contr. U. S. Nat. Herb.* 18: 309. 1917.

DISTRIBUTION

Low ground, wet savannas and swamps, and along streams and ditches, Alabama to Texas and Mexico and south to Argentina; also in Cuba.

ALABAMA: Perdido Bay, *Mohr* in 1893.

LOUISIANA: Cameron, *Tracy* 8395.

TEXAS: Galveston, *Hitchcock* 3867. *Pierce*, *Tracy* 7391, 7397. Turtle Bay Peninsula, *Tharp* 1407. Port Lavaca, *Allen* 16; *Smith* in 1923. Houston, *Fisher* 79; *Hall* 807; *Nealley* 75 in 1892; *Thurrow* in 1898. Brownsville, *Hitchcock* 5407; *Nealley* in 1889; *Pringle* 2049.

NUEVO LEÓN: *Arsène* 6301; *Hitchcock* 5565; *Pringle* 2516.

SAN LUIS POTOSÍ: Cárdenas, *Hitchcock* 5740.

SINALOA: Culiacán, *Brandegge* in 1904; *Palmer* 1552 in 1891.

JALISCO: Guadalajara, *Hitchcock* 7318; *Palmer* 245 in 1886. San Nicolás, *Hitchcock* 7197. Zapotlán, *Hitchcock* 7147. Tequila, *Palmer* 206 in 1886.

GUANAJUATO: Irapuato, *Hitchcock* 7388, 7409. Acámbaro, *Hitchcock* 6933.

QUERÉTARO: Querétaro, *Arsène* 10272, 10349; *Hitchcock* 5817, 5869.

HIDALGO: Ixmiquilpan, *Rose*, *Painter & Rose* 9059.

VERA CRUZ: Orizaba, *Botteri* 110, 566, 1286; *Bourgeau* 2544; *Hitchcock* 6313; *Mohr* 566 (probably collected with *Botteri* and same as his 566); *Müller* 2061; *Seaton* 62. Córdoba, *Hitchcock* 6451. Jalapa, *Hitchcock* 6620. Tlacotalpam, *Nelson* 523.

PUEBLA: Santa Barbara, *Arsène* 5268.

MEXICO: Federal District, *Arsène* 8277.

MORELOS: Cuernavaca, *Hitchcock* 6823, 6880, 6881.

MICHOACÁN: Morelia, *Arsène* 2384b, 3176. Uruápan, *Hitchcock* 6992.

OAXACA: Oaxaca, *Hitchcock* 6152, 6208. Santa Catarina Cañon, *Pringle & Conzatti* 272. Valley of Oaxaca, *Conzatti & González* 349.

GUATEMALA: Cobán, *Türkheim* II. 1210. Guatemala City, *Hayes* in 1860; *Popenoe* 670; *Tonduz* 702. La Aurora, *Morales* 720.

CUBA: Habana, *Baker*, *Tracy & Hasselbring* 3096; *Ekman* 1253, 1257; *Léon* 571, 937, 4635; *Tracy* 9119. Arroyo Apolo, *Léon* 272. Marianao, *Léon* 588. Macagua, *Ekman* 16805.

VENEZUELA: Caracas, *Pittier* 7236, 9633.

PARAGUAY: Pilcomayo River, *Morong* 1584.

URUGUAY: Montevideo, *Rural Federation of Montevideo* in 1924.

ARGENTINA: Prov. Santiago del Estero, *Venturi* 5713, 5728. Prov. Catamarca, *Venturi* 7198.

ECUADOR: La Magdalena, *Harteman* 16.

PERU: "Canruru, Andes of Peru," *Savatier* in 1876-79 (Kew Herb.).

25. *Paspalum hartwegianum* Fourn.

Paspalum hartwegianum Fourn. Mex. Pl. 2: 12. 1886. "*P. lentiferum* Lam. var. sec. cl. Munro [in Bentham] Pl. Hartw. p. 326 [error for 346]. Ad fossas prope Léon (Hartw. n. 245)." Hartweg's no. 245, bearing the name in Fournier's script, is in the Paris Herbarium. The specimen named by Munro is in the Kew Herbarium. The exact date of Fournier's publication is not known.⁷⁸ *Paspalum buckleyanum* was published in September, 1886, presumably later than *P. hartwegianum*. This name was earlier listed without description by Hemsley.⁷⁹

Paspalum buckleyanum Vasey, Bull. Torrey Club 13: 167. 1886. "Collected by Dr. Buckley in Texas." The type specimen in the National Herbarium is a

⁷⁸ See p. 20 for discussion of date of this work.

⁷⁹ Biol. Centr. Amer. Bot. 3: 479. 1885.

single culm 90 cm. long, lacking the base, the panicle with six racemes. In the Index Kewensis⁸⁰ this name is erroneously listed under *Panicum*.

DESCRIPTION

A rather wiry glabrous perennial, the culms in hard clumps or solitary, compressed, glabrous, ascending, 0.5 to 1.5 meters long, the lower part decumbent as in *P. lividum* but less commonly creeping, branching from the lower nodes, the branches rarely flowering; sheaths smooth, the lower rather papery, overlapping; ligule membranaceous, 1 to 3 mm. long; blades mostly firm, ascending, usually about as wide at the base as the summit of the sheath, 10 to 35 cm. long, 2 to 6 mm. wide, the margins very scabrous, sometimes with a few hairs at the very base, the mid-nerve prominent on the lower surface; racemes 3 to 13, commonly 4 to 7, ascending, mostly distant half to two-thirds their own length on a slender glabrous axis, pale yellowish-green, 2 to 9 cm. long, with a few long hairs in the axils; rachis 1 to 1.5 mm. wide, very minutely scabrous; spikelets in pairs, imbricate, about 3 mm. long and 1.5 mm. wide, elliptic, apiculate; second glume and sterile lemma equal, softly and often sparsely pubescent, 3 to 5 nerved; fruit 2.5 mm. long, 1.3 mm. wide, elliptic, minutely striate-roughened.

This species has recently been grown in Mississippi as a forage grass. It is sensitive to frost, but is promising for pasture along the Gulf coast.

DISTRIBUTION

Wet prairies, alkaline meadows, and along irrigation ditches, sometimes growing in the water, southern Texas and throughout Mexico.

TEXAS: Corpus Christi, *Hitchcock* 2419, 5378; *Swallen* 1053. San Diego, *Nealley* 95 in 1892. Kingsville, *Piper* in 1906. Mission, *Olive* 21. Without locality, *Buckley* in 1883; *Nealley* in 1887.

SONORA: Hermosillo, *Hitchcock* 3622.

NUEVO LEÓN: Monterrey, *Hitchcock* 5564.

SAN LUIS POTOSÍ: Cárdenas, *Hitchcock* 5748½.

GUANAJUATO: Irapuato, *Hitchcock* 7400.

Acámbaro, *Hitchcock* 6938.

MORELOS: Cuernavaca, *Hitchcock* 6879.

MICHOACÁN: Valley of Zamora, *Pringle* 9599.

OAXACA: Oaxaca, *Conzatti* 3600; *Hitchcock* 6130, 6177, 6189, 6190.

26. *Paspalum alcalinum* Mez

Paspalum alcalinum Mez, Repert. Nov. Sp. Fedde 15: 75. 1917. "Mexico, Dept. San Luis Potosi, in pratis alcalinus prope Hacienda de Angostura * * * (Pringle no. 3764)." Specimens of *Pringle* 3764 bearing the name in Mez's script were examined in the herbarium at the University of Munich and in that of the Botanical Museum at Berlin. Duplicates are in the United States National Herbarium.

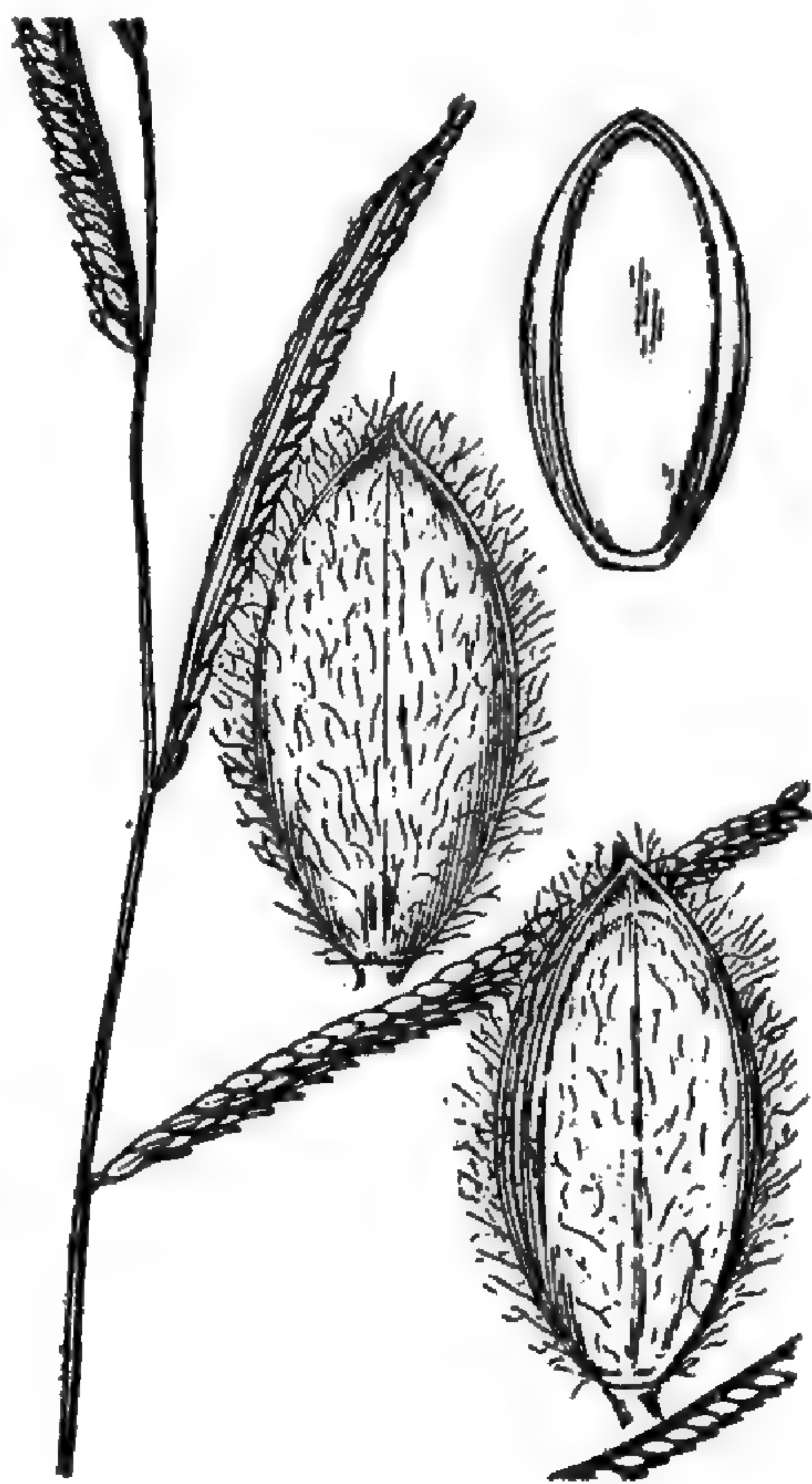


FIGURE 26.—*P. hartwegianum*. From type specimen of *P. buckleyanum*.

⁸⁰ Suppl. 1: 312. 1906.

DESCRIPTION

A glabrous perennial in tufts of 1 or 2 flowering culms and a few leafy sterile shoots, rather pale; culms 85 to 140 cm. tall, simple, or rarely branching, erect, rather robust, slightly compressed; nodes glabrous; sheaths elongate, overlapping, mostly 7 to 10 on the flowering culm, withdrawn from the culm and with involute margins toward the summit, very smooth, sometimes with a few hairs on the margin at the summit; ligule thin-membranaceous, lacerate, 5 to 6 mm. long; blades suberect, strict, 15 to 50 cm. long, 3 to 7 mm. wide (the uppermost reduced), the junction with the sheath obscure, folded at base, flat toward the middle and with a long involute setaceous and scabrous tip, scabrous on the upper surface and often stiffly ciliate at base, the margins and sometimes the midrib beneath very scabrous; panicle 15 to 18 cm. long, the common axis slender but rigid, angled, a tuft of long hairs in the axils; racemes 6 to 12, unevenly spaced, the middle mostly approximate, 4 to 7 cm. long, thick, narrowly ascending, the rachis 1.5 mm. wide, with scabrous margins; spikelets mostly in pairs (or solitary toward base and summit), imbricate, 3 mm. long, 1.5 mm. wide, elliptic, subacute; glume and sterile lemma equal, 5-nerved, pale brown to bronze or purplish, sparsely soft-pubescent; fruit 2.5 mm. long, about 1.4 mm. wide, elliptic, brownish, strongly striate-papillose, the margins of the lemma paler and nearly smooth.



FIGURE 27.—*P. alcalinum*. From type collection

Closely related to *P. hartwegianum*, distinguished chiefly by the erect habit and more numerous racemes of darker spikelets.

DISTRIBUTION

Alkaline meadows, and along irrigation ditches, Mexico, Paraguay and Argentina. Dr. Lorenzo R. Parodi writes that this species is abundant in clayey soils of the subtropical savannas of the Territory of Formosa, Argentina.

SAN LUIS POTOSÍ: Cárdenas, *Hitchcock* 5743½. Hacienda de Angostura, *Pringle* 3764.

PARAGUAY: Puerto Casado, Chaco, *Rojas* 2778.

ARGENTINA: Palermo, *Parodi* 7. Roca Viejo, Chaco, *Venturi*-(*Herb. Parodi*) 1178.

27. *Paspalum crinitum* Chase

Paspalum crinitum Chase in *Hitchc. Contr. U. S. Nat. Herb.* 17: 237. 1913. "Type in the U. S. National Herbarium, no. 824361, collected in alkaline meadows, Hacienda de Angostura, State of San Luis Potosí, Mexico, July 10, 1891, by C. G. Pringle (no. 3755)." This collection has larger panicles than common and the lower sheaths are more conspicuously hairy than in most of the other specimens.

DESCRIPTION

A slender erect cespitose perennial, leafy at the base; culms simple, 0.6 to 1 meter tall, glabrous; sheaths mostly overlapping, the lower crowded, clothed with long gray hairs, the others densely and finely pubescent to glabrescent; ligule membranaceous, 2 to 5 mm. long, rather firm; blades flat, ascending, mostly

rather firm, finely pubescent on both surfaces, 10 to 25 cm. long, 4 to 8 mm. wide, the lower shorter, in age often disarticulating from the sheath, the uppermost reduced to a point of the elongate sheath; panicle 10 to 30 cm. long, the axis slender, usually bearing a tuft of long white hairs in the axils, otherwise glabrous; racemes 4 to 11, slender, finally spreading, distant, or irregularly approximate, the lower as much as 12 cm. long, occasionally compound; rachis slender, dark purple, bearing a few scattered hairs along the angles or glabrous; spikelets in pairs, loosely imbricate, light yellowish green or purple-tinged, 2.5 to 2.8 mm. long, 1.3 mm. wide, elliptic, the slender dark pedicels of the upper of the pair about 1 mm. long; second glume and sterile lemma thin, equal, 3-nerved, sparsely pilose with delicate hairs or glabrous; fruit 2.3 to 2.5 mm. long, 1.2 mm. wide, elliptic, pale.

DISTRIBUTION

Moist ground and alkaline meadows, highlands of Mexico.

FIGURE 28.—*P. crinitum*. From type specimen

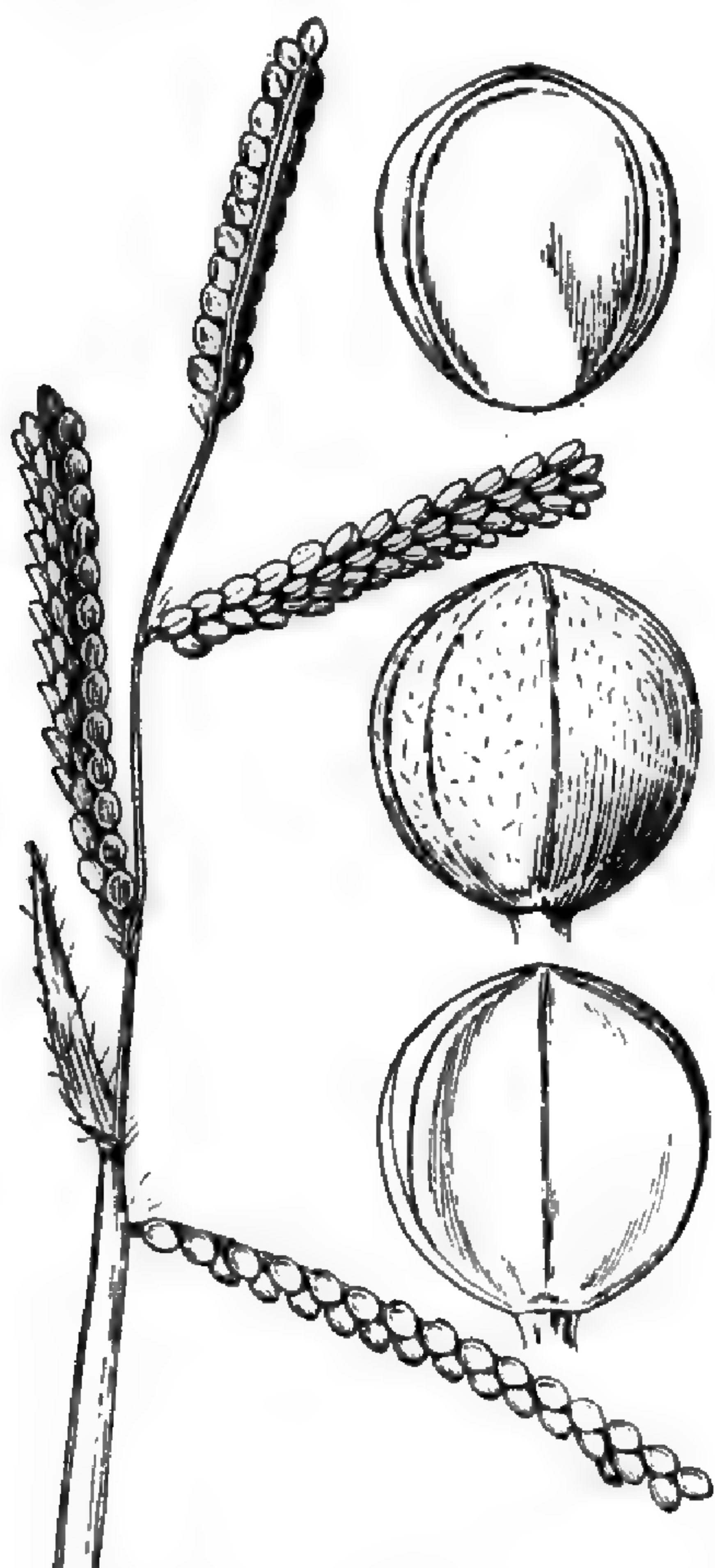
COAHUILLO: Saltillo, *Palmer* 338 in 1904.
 SAN LUIS POTOSÍ: Hacienda de Angostura, *Pringle* 3755.
 JALISCO: Orozco, *Hitchcock* 7382.
 PUEBLA: Puebla, *Aibert* in 1911; *Arsène* 1604, 2284; *Nicolás* 131.

28. *Paspalum mutabile* Chase, sp. nov.

DESCRIPTION

A rather slender perennial, in small tufts, leafy toward the base; culms 20 to 40 cm. tall, ascending or spreading, branching at the lower nodes

or simple, glabrous; nodes black, appressed-pubescent or glabrate; sheaths papillose-pilose or the upper nearly glabrous; ligule brown, about 1 mm. long; blades ascending, rather thin, flat, 5 to 15 cm. long, 5 to 10 mm. wide (the uppermost much reduced), rounded at base, sparsely papillose-pubescent on both surfaces;

FIGURE 29.—*P. mutabile*. From type specimen

racemes 3 to 6, usually 4, spreading or ascending, 1.5 to 5.5 cm. long, the common axis slender, glabrous; rachis 1 to 1.5 mm. wide, glabrous, with a few long hairs at the base; spikelets solitary or in pairs, mostly crowded, 2 mm. long, about 1.9 mm. wide, broadly obovate; glume and sterile lemma equal, 3 to 5 nerved, the glume minutely pubescent, the sterile lemma glabrous or very obscurely puberulent; fruit nearly the size of the spikelet, pale stramineous, very minutely striate-roughened.

Type in the U. S. National Herbarium, no. 928949, collected on the clay bank of the railway cut, near Cárdenas, San Luis Potosí, Mexico, July 20, 1910, by A. S. Hitchcock (no. 5773).

Two other collections from the same locality, *Hitchcock* 5730½ and 5736, are the only other specimens of this species known.

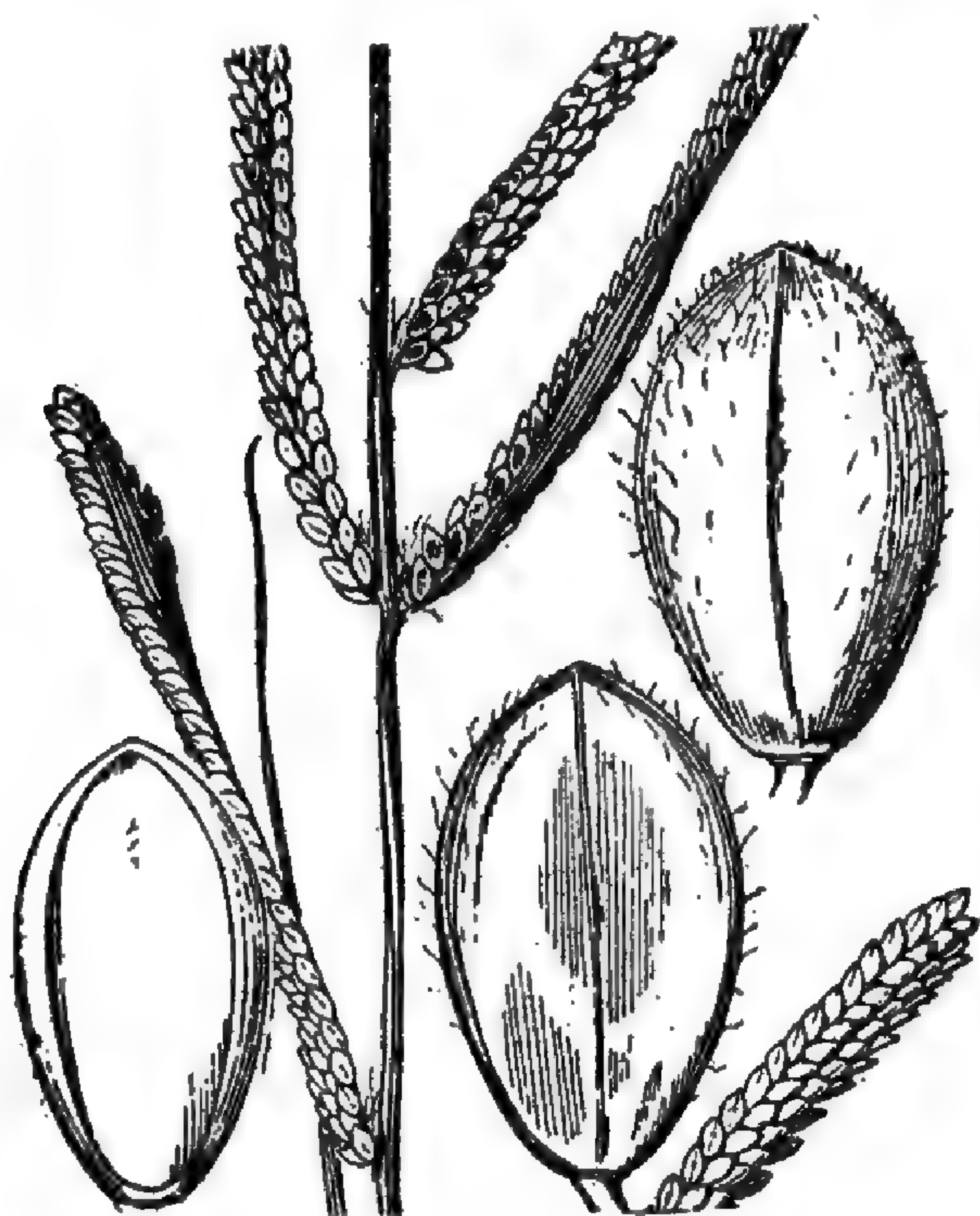


FIGURE 30.—*P. tinctum*. From type specimen

29. *Paspalum tinctum* Chase,
sp. nov.

DESCRIPTION

A rather stout perennial, in hard tufts; culms simple, 1 to 1.5 meters tall, ascending or erect from a slightly decumbent base, subcompressed, glabrous; nodes glabrous; sheaths loose, pubescent on the margin toward the summit or glabrous, the lower crowded and rather papery; ligule about 2 mm. long; blades ascending, conduplicate at base and about as wide as the summit of the sheath, flat above, 15 to 40 cm. long, 4 to 7 mm. wide (the uppermost much reduced), glabrous or sparsely pilose on the upper surface, especially at base; panicle 15 to 25 cm. long, the common axis slender but rather rigid, angled, a tuft of long hairs

in the axils; racemes 9 to 20, unevenly spaced, some distant, some subfasciculate, thick, somewhat flexuous, the lower 5 to 7 cm. long, spreading, the others gradually shorter, ascending; rachis 1.5 to 2 mm. wide, dark green or purple; spikelets in pairs, densely imbricate, 2.8 to 3 mm. long, about 1.8 mm. wide, elliptic-obovate, depressed plano-convex; glume and sterile lemma equal, 3-nerved, yellowish green variegated with purple, sparsely soft-pubescent to nearly glabrous; fruit 2.6 mm. long, 1.5 mm. wide, elliptic, smooth, pale.

Type in the U. S. National Herbarium, no. 929014, collected in moist sandy clay plain, Irapuato, Guanajuato, Mexico, at 1,900 meters altitude, October 1, 1910, by A. S. Hitchcock (no. 7404).

The type, which is the most perfect specimen, has spikelets less pubescent than have the others.

DISTRIBUTION

Open ground in the highlands of central and southern Mexico.

JALISCO: Chapala, *Holway* 3437.

GUANAJUATO: Irapuato, *Hitchcock* 7404.

MORELOS: Cuernavaca, *Hitchcock* 6882.

MICHOACÁN: Valley of Zamora, *Pringle* 9600.

30. *Paspalum arsenei* Chase, sp. nov.

DESCRIPTION

A nearly glabrous perennial, in small tufts; culms simple, or with sterile shoots from the lower nodes, 60 to 100 cm. tall, occasionally taller, ascending, sometimes decumbent at base and rooting at the lower nodes; nodes glabrous or sparsely pilose; sheaths loose, rather thin, sparsely papillose-pilose on the margin or glabrous, the lower mostly overlapping; ligule about 3 mm. long; blades flat, 8 to 30 cm., mostly 15 to 25 cm., long, 8 to 12 mm. wide, a few hairs at the rounded base, otherwise glabrous, the margins scabrous; panicle 8 to 20 cm. long, narrow, the common axis slender, angled, a few hairs in the axils; racemes 4 to 10, the lower distant, the upper approximate, 2 to 12 cm. long, ascending, or in age the lower widely spreading, the rachis 1.2 to 1.4 mm. wide, rather pale; spikelets in pairs, imbricate, or the lower solitary, sometimes distant or abortive, 2.9 to 3.1 mm. long, about 1.8 mm. wide, elliptic-obovate, plano-convex; glume and sterile lemma equal, 3 to 5 nerved, olivaceous, more or less stained with purple, sparsely and softly appressed-pubescent; fruit about 2.8 mm. long, elliptic, light brownish-stramineous, smooth and shining.

Type in the U. S. National Herbarium no. 1000431, collected at "Mayorazgo, sur l'Atoyac, alt. 2,120 meters, vicinity of Puebla, Mexico," July 18, 1907, by Brother G. Arsène (no. 1411).

In the type specimen the culms are not decumbent and the racemes are narrowly ascending. Of the other specimens one shows a decumbent base and one (overmature) lower racemes widely spreading. Arsène's no. 58 is depauperate, the panicles of 2 to 4 short racemes.

The species is named for Brother G. Arsène, whose numerous collections have contributed greatly to our knowledge of Mexican grasses.

DISTRIBUTION

Open grassland with argillaceous soil, in the highlands of Puebla and Michoacán, Mexico.

JALISCO: San Nicolás, *Hitchcock* 7181, 7182.

PUEBLA: Puebla, *Arsène* 58, 1411.

MICHOACÁN: Morelia, *Arsène* 2384, 2693, 8324, 8535. Loma Santa Maria, *Arsène* in 1909.

Notata.—Perennials with compressed culms, leafy at base; racemes 2, conjugate; spikelets solitary.

Spikelets golden brown, transversely marked with dark lines.

Spikelets green.

Rhizome stout, horizontal, forming tough sod.

Spikelets 2.5 to 3 mm. long.....31. *P. notatum*.

Spikelets less than 2.5 mm. long.....32. *P. minus*.

Rhizome none or short and vertical.

Plants in dense tufts, culms widely spreading to ascending; glume glabrous.

33. *P. pumilum*.

Plants in small loose tufts; glume ciliate.....34. *P. subciliatum*.

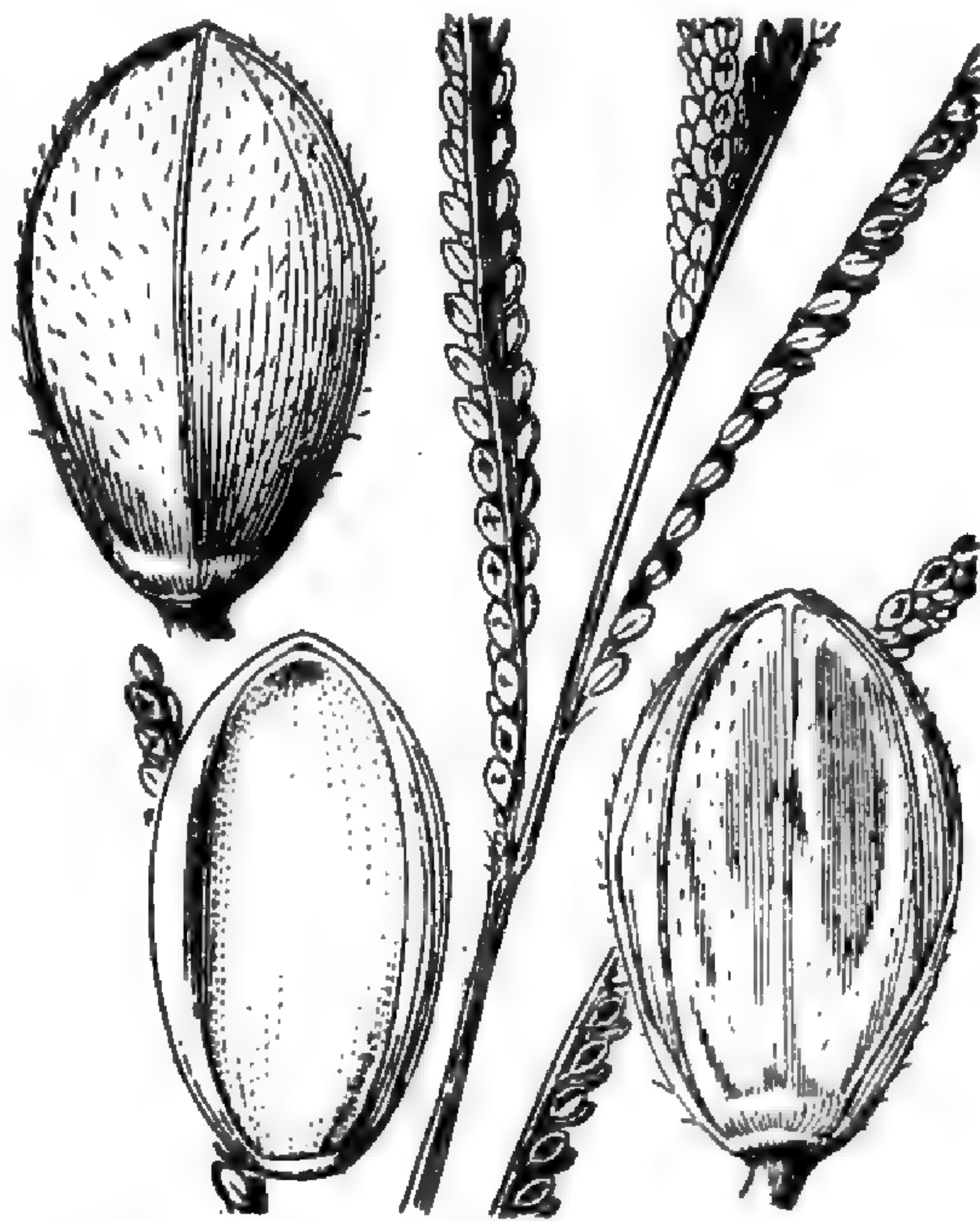


FIGURE 31.—*P. arsenei*. From type specimen.

35. *P. serpentinum*.

31. *Paspalum notatum* Flügge

Paspalus notatus Flügge, Monogr. Pasp. 106. 1810. "Insula St. Thomas. Exemplaria mecum communicaverunt Schrader et Ventenat." The type has not been located (see p. 1). A specimen in the Lamarck Herbarium in Paris, labeled "Paspalum. Ventenat. St. Thomas," and one in the British Museum "ex herb. Nolte," labeled "St. Thomas, Ventenat 1802" are the average West Indian form. This collection was not found in the Willdenow Herbarium nor elsewhere in the Berlin Herbarium.

Paspalum taphrophyllum Steud. Syn. Pl. Glum. 1: 19. 1854. "Sieber. hrbr. mixt. nr. 365. Ins. Martinica." The type in the Rijks Herbarium at Leiden is Sieber's no. 364, the number 365 cited being a misprint. Sieber's no. 364 in the United States National Herbarium is labeled Trinidad, but in the Institut Botanique, Caen, it is labeled Martinique. The spikelets are scarcely 3 mm. long.

Paspalum distachyon Willd.; Doell in Mart. Fl. Bras. 2²: 73. 1877. Not *Paspalum distachyon* Poit. 1834. A herbarium name given as synonym of *P. notatum* Flügge.

Paspalum notatum var. *latiflorum* Doell in Mart. Fl. Bras. 2²: 73. 1877. "Brasilia meridionali et ad Montevideo (Sello)." No specimen so named by Doell has been located. A Sello specimen from Brazil, from the Berlin Herbarium, bearing the numbers 3419 and 3506, has orbiculate-elliptic spikelets in the middle of the racemes and probably represents Doell's variety.

Paspalum saltense Arech. Anal. Mus. Nac. Montevideo 1: 53. 1894. "En campos gramíneos del Departamento del Salto," Uruguay. In the United States National Herbarium is a specimen collected in Salto in 1893 and sent by Professor Aréchavaleta. The spikelets are slightly more than 3 mm. long.

DESCRIPTION

An ascending perennial with short stout woody horizontal rhizomes, forming tough but not extensive sods, the rhizome clothed with the firm persistent bases of old sheaths; culms simple, 15 to 50 cm. tall, rarely taller, glabrous, flattened, the nodes dark; leaves crowded at the base, the overlapping sheaths usually short and reaching to a common height, the blades stiffly spreading,

thus forming a rather conspicuous distichous tuft near the base of the culm; sheaths compressed, keeled, rather glossy, glabrous or ciliate toward the summit or rarely pubescent throughout; ligule a minute membrane with a dense row of white hairs about 1 mm. long back of it; blades flat, or folded at base, 2 to 30 cm. long (the uppermost reduced to a mere point), 3 to 10 mm. wide, linear, usually sparsely ciliate toward the base, sometimes almost to the summit, otherwise glabrous; racemes 2, rarely 3, subconjugate (the common axis about 5 mm. long), recurved-ascending, 2.5 to 12 cm. long (usually 4 to 7 cm.),

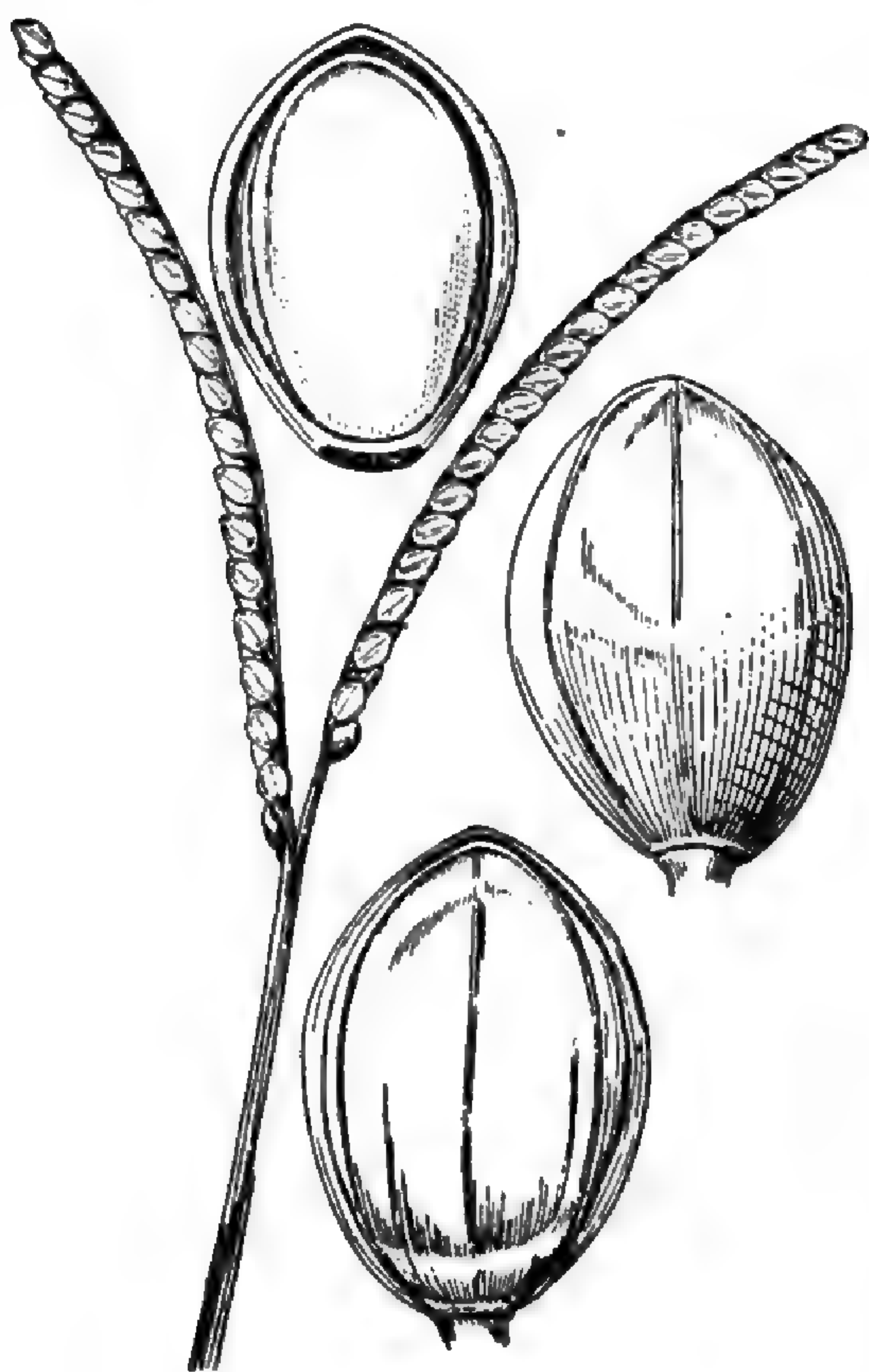


FIGURE 32.—*P. notatum*. From Chase 6639

relatively rather thick; rachis about 1 mm. wide, glabrous, usually flexuous toward the summit; spikelets solitary, 2.5 to 3.8 mm. long, 2 to 2.8 mm. wide, ovate to obovate; glume and sterile lemma equal, firm in texture, smooth and shining, 5-nerved (the intermediate nerves often obscure); fruit 2.5 to 3.5 mm. long, 1.8 to 2.5 mm. wide, oval.

In what is presumably the typical form from the West Indies the spikelets are not more than 3 mm. long (except in three collections from Havana), while in the continental specimens the spikelets are 3 to 3.8 mm., rarely 4 mm., long. The continental specimens are on the average larger than those of the West Indies and the racemes longer. Except in size the continental form, to which belongs *P. saltense* Arech., does not differ in any way from the Antillean form. The West Indian form is about half way between *P. saltense* and *P. minus*, which Fournier differentiated from the large form of Mexico. From the largest spikelets of this form to the smallest of *P. minus* there is an almost unbroken series.

The following specimens from Havana belong to the continental form: *Léon* 117b, 928½ and *Tracy* 9118. *Hitchcock* 6962 and 6984 from Uruápan, Mexico, are the Antillean form. In North American specimens the foliage is nearly glabrous. In a few specimens from Venezuela and Brazil the foliage is conspicuously pilose: *Bailey* 247; *Chase* 8360, 9092; *Pittier* 7212, 7242. *Hitchcock's* no. 5765 is exceptional in having four racemes, a short pair above the ordinary pair.

This species has been introduced as a pasture grass in the Gulf States under the name of Bahia grass. It is proving of value, thriving on both clayey and sandy soil and being readily grazed. It forms the main constituent of native pasture in Cuba and Porto Rico and in parts of Costa Rica, Brazil, Uruguay, and Argentina.

DISTRIBUTION

Open ground, savannas, and pastures from sea level to 2,000 meters, from central eastern Mexico to Argentina and throughout the West Indies; introduced in the southern United States, and rare as a ballast plant northward.

NEW JERSEY: Camden, *Scribner* in 1880.

FLORIDA: Gainesville, *Weber* 214.

LOUISIANA: St. Martinsville, *Langlois* in 1893.

NUEVO LEÓN: Monterrey, *Arsène* 6283.

SAN LUIS POTOSÍ: Cárdenas, *Hitchcock* 5727, 5778. Las Canoas, *Hitchcock* 5765; *Pringle* 3774.

NAYARIT: Tepic, *Mexía* 570.

JALISCO: Guadalajara, *Hitchcock* 7281; *Holway* 3421; *Palmer* 295 in 1886; *Pringle* 11240. La Junta, *Hitchcock* 6996. San Nicolás, *Hitchcock* 7183. Zapotlán, *Hitchcock* 7141.

VERA CRUZ: Orizaba, *Bourgeau* 2749; *Hitchcock* 6322. Córdoba, *Hitchcock* 6430. Jalapa, *Hitchcock* 6591. Vera Cruz, *Hitchcock* 6565, 6577. Mecapalco, *Liebmann* 156.

PUEBLA: Mt. Orizaba, *Seaton* 112 B.

MORELOS: Cuernavaca, *Hitchcock* 6838.

MICHOACÁN: Morelia, *Arsène* 2917. Uruápan, *Hitchcock* 6962, 6984.

COLIMA: Colima, *Palmer* 138 in 1897.

OAXACA: Oaxaca, *Buchinger* 960; *Hitchcock* 6109. Valley of Oaxaca, *Conzatti & González* 341; *Nelson* 1262. Tomellín, *Hitchcock* 6245. Las Sedas, *Smith* 933. Ixcotel, *Conzatti* 3616.

CHIAPAS: Ocuilapa, *Nelson* 3033.

MEXICO: (Republic of): La Agua Azul, *Oliva* in 1895.

- GUATEMALA: Cobán, *Johnson* 441. Guatemala City, *Hitchcock* 9020; *Rojas* 37; *Tonduz* 683. Amititlan, *Popenoe* 696. Fiscal, *Deam* 6205. La Aurora, *Morales* 722. Las Vacas, *Hayes* in 1860. Santa Rosa, *Heyde & Lux* (*Dist. Smith*) 3910; *Lehmann* 1662. Without locality, *Heyde* 734.
- HONDURAS: Tela, *Standley* 54484. Siguatepeque, *Standley* 55966.
- EL SALVADOR: San Salvador, *Renson* 353; *Standley* 23655. Finca San Nicolás, *Choussy* in 1923.
- NICARAGUA: Corinto, *Hitchcock* 8615. Masaya, *Hitchcock* 8658.
- COSTA RICA: Alajuelita, *Tonduz* 8824. San José, *Hitchcock* 8454; *Tonduz* 752. Río Torres, *Tonduz* 306. Desamparados, *Pittier* 4325. Las Cóncevas, *Lank-ester* in 1920. Turrialba, *Pittier* 16120. Río Grande, *Herb. Inst. phys.-geogr. Costaric.* 14337.
- PANAMA: David, *Hitchcock* 8367. Chepo, *Pittier* 4453. Chorrera, *Hitchcock* 8136. Canal Zone, *Hitchcock* 7998, 8009.
- CUBA: Guane, *Léon & Roca* 6989. Sierra la Guira, *Léon* 5167. San Diego de los Baños, *Léon* 4526. Herradura, *Baker* 2968; *Hitchcock* 454. San Ramón, *Ekman* 13052. Mariel, *Ekman* in *Amer. Gr. Nat. Herb.* 914. Habana, *Baker, Tracy & Hasselbring* 3097; *Ekman* 1251; *Léon* 117b, 928; *Tracy* 9118. Guanabacoa, *Hitchcock* 23224; *Léon* in 1907. La Magdalena, *Baker* 2. Placetas del Sur, *Léon* 6423. Mordazo, *Ekman* 17096. Baraguá, *Hitchcock* 23360. Isle of Pines, *Palmer & Riley* 1119. Without locality, *Wright* 3438 in part.
- JAMAICA: Troy, *Hitchcock* 9784. Claremont, *Hitchcock* 9495. Holly Mount, *Amer. Gr. Nat. Herb.* 564. New Forest, *Hitchcock* 9821. Lititz Savanna, *Harris* 12443. Bull Head Mountain, *Hitchcock* 9540. Kingston, *Hitchcock* 9471. Westphalia, *Harris* 11570. Blue Mountains, *Perkins* 1488. Cinchona, *Harris* 9497; *Hitchcock* 9696, 9711. Castleton Gardens, *Hitchcock* 9395. Hardware Gap, *Harris* 11544.
- HAITI: Port-Margot, *Ekman* H 2927. Boche à Bateau, *Ekman* H 734. Aux Cayes, *Ekman* H 863.
- DOMINICAN REPUBLIC: Samaná Peninsula, *Abbott* 152.
- PORTO RICO: Mayaguez, *Chase* 6287, 6314; *Holm* 173. Maricao, *Britton, Cowell & Brown* 4476; *Chase* 6236. Lares, *Chase* 6585. Bayamon, *Hioram* 347. Vega Beja, *Chase* 6424. San Juan, *Chase* 6344, 6401. Catano, *Chase* 6639. Rio Piedras, *Chase* 6779; *Hioram* 807. El Yunque, *Chase* 6729. Colonia San Miguel, *Britton & Shafer* 1624.
- LEEWARD ISLANDS: Antigua, *Wulfschlaegel* 593. Dominica, *Hitchcock* 16421.
- WINDWARD ISLANDS: Martinique, *Duss* 558. Grenada, *Broadway* 1793½.
- COLOMBIA: Corinto, *Pittier* 993. Palmira, *Pittier* 845. Suratá, *Killip & Smith* 16496. Central Cordillera, *Dawe* 854.
- VENEZUELA: Caracas, *Bailey* 247; *Pittier* 7177, 7212, 7242, 9656, 9707. Dos Caminos, *Pittier* 6308, 7964a. "Carma," *Jahn* 315.
- BRAZIL: Bello Horizonte, *Chase* 9092. Serra Mantiqueira, *Chase* 8691. Serra de Itatiaia, *Chase* 8360. Rio de Janeiro, *Chase* 8213. Rio Capinzal, *Dusén* 17864. São Leopoldo, *Dutra* 503. Without locality, *Sello* 3417.
- PARAGUAY: San Bernardino, *Rojas* 1006. Central Paraguay, *Morong* 548.
- URUGUAY: Palmira, *Herter* (*Herb. Osten*) 18814. Colonia, *Herter* (*Herb. Osten*) 18815. Cerro Largo, *Herter* (*Herb. Osten*) 18623. Durazno, *Schroeder* (*Herb. Osten*) 18736. Montevideo, *Herter* 327; *Lombardo* 1978; *Marchesi* 1859, 3104. Without locality, *Arechavaleta* in 1881 and 1892.
- PERU: Huánuco, *Macbride* 3519.
- BOLIVIA: Buena Vista, *Steinbach* 5273, 7020. Santa Cruz, *Steinbach* (*Herb. Osten*) 14959.
- ARGENTINA: Mocovi, *Venturi* 63. Posadas, *Ekman* 578. Prov. Mendoza, *Jensen* in 1904-5. Córdoba, *Stuckert* 5977, 11048, 12664; *Stuckert* (*Kneucker Gram.*) 364. Buenos Aires, *Parodi* 144, 145. Prov. Catamarca, *Venturi* 7098.

32. *Paspalum minus* Fourn.

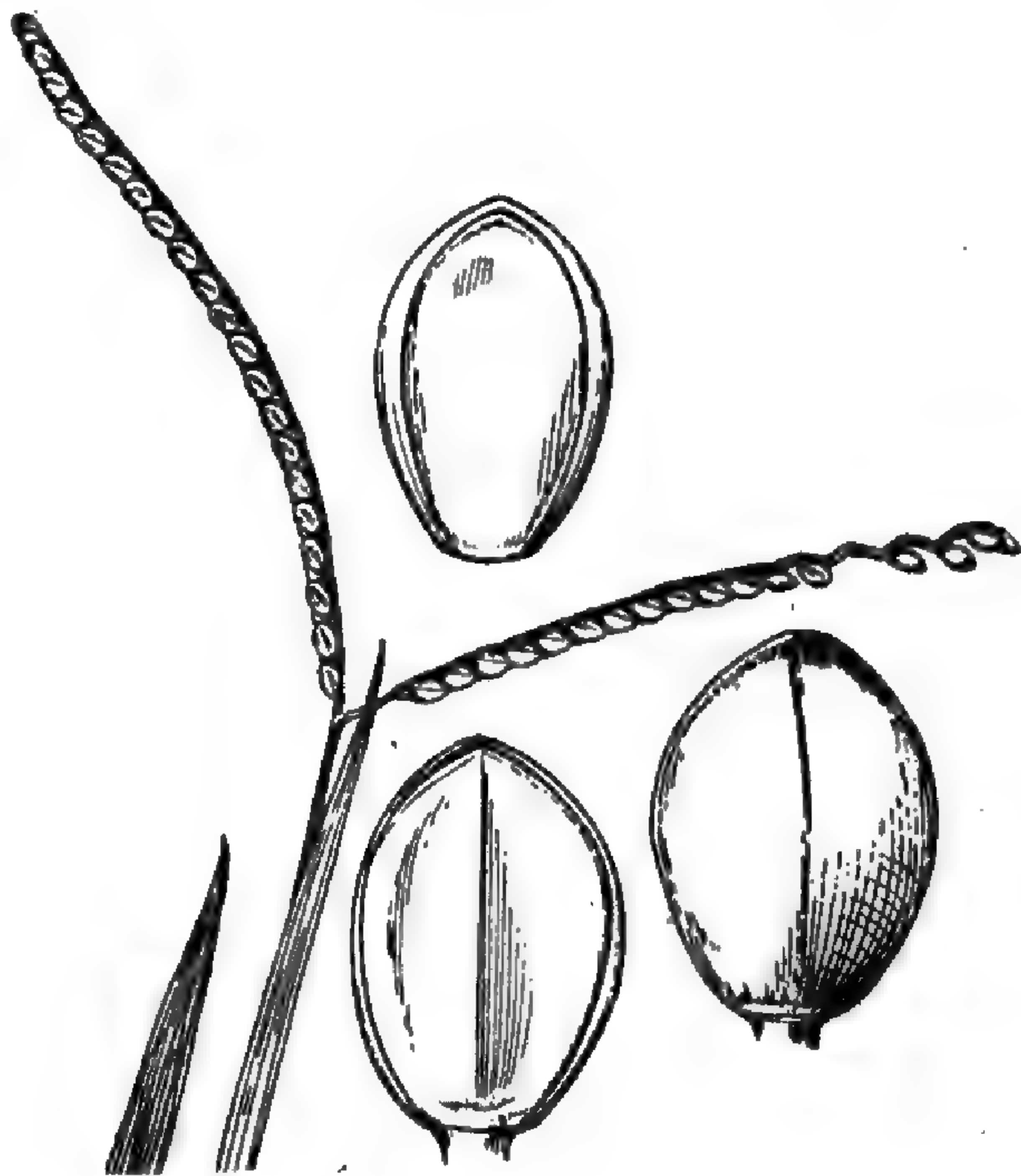
Paspalum minus Fourn. Mex. Pl. 2: 6. 1886. "In valle Cordovensi (BOURG. n. 2298); Paso del Correo, maio (LIEBM. n. 154)." The type, *Bourgeau* 2298, bearing the name in Fournier's script, in the Paris Herbarium, is a dense tuft. In 2 of the 9 inflorescences there are 3 racemes. The spikelets are 2.1 mm. long.

DESCRIPTION

Similar to *P. notatum*, commonly in denser mats, on the average smaller, the culms rarely more than 30 cm. long, the sheaths and blades 5 to 15 cm. long, more commonly ciliate, sometimes conspicuously so; racemes more slender, less rarely 3; spikelets 2 to 2.5 mm. long, 1.5 to 1.6 mm. wide, oval, less shining than those of *P. notatum*.

DISTRIBUTION

Open slopes and savannas from sea level to 1,500 meters, from central Mexico to Paraguay and Bolivia, and in the Greater Antilles.

FIGURE 33.—*P. minus*. From type collection

VERA CRUZ: Córdoba, *Bourgeau* 2298. Jalapa, *Hitchcock* 6590.

MEXICO (Republic of): Mecapalco, *Liebmann* 156. Paso del Correo, *Liebmann* 154.

GUATEMALA: Puerto Barrios, *Hitchcock* 9161. Izabel, *Blake* 7744. Cubilquitz, *Türkheim* (*Dist. Smith*) 7697, 8793.

NICARAGUA: San Juan del Norte, *Oersted* 14107.

COSTA RICA: Puntarenas, *Hitchcock* 8583. Guápiles, *Standley* 37288. San José, *Hitchcock* 8497. Boruca, *Tonduz* 4471. Buenos Aires, *Pittier* 3658.

PANAMA: El Boquete, *Hitchcock* 8234. Baja Boquete, *Killip* 4582. Cerra Vaca, *Pittier* 5345. Chorrera, *Hitchcock* 8123. Chepo, *Pittier* 4624. Panama, *Piper* 5293. Canal Zone, *Hitchcock* 7973, 7978; *Killip* 4027; *Standley* 26355; *Stork* 53.

CUBA: Arroyo del Sumidero, *Léon & Shafer* 13670; *Shafer & Léon* 13677. Heradura, *Hitchcock* 455, 23439; *Tracy* 9093. Cajalbana, *Léon & Charles* 4856. San Diego de los Baños, *Léon* 4468. Pinar del Río, *Hitchcock* 23284, 23305. Mordazo, *Ekman* 17093. Isle of Pines, *Britton & Wilson* 14695; *Palmer & Riley* 978. Without locality, *Wright* 3438 in part.

JAMAICA: Bull Head Mountain, *Hitchcock* 9540½.

HAITI: Las Cahobas, *Cook, Scofield & Doyle* 103.

DOMINICAN REPUBLIC: Cotuy, *Abbott* 830, 850.

PORTO RICO: Trujillo Alto, *Chase* 6368.

COLOMBIA: Buena Ventura, *Hitchcock* 19904. Cali, *Pittier* 641. Jamundí, *Pittier* 935.

VENEZUELA: Dividive, *Pittier* 10821.

PARAGUAY: Ypacaray, *Hassler* 12546. Sapucay, *Hassler* 13033.

BOLIVIA: San Carlos, *Buchtien* 79 in 1926.

33. *Paspalum pumilum* Nees

Paspalus pumilus Nees, Agrost. Bras. 52. 1829. "Habitat in sylvarum marginibus et ad vias versus Almada et Ferracas provinciae Bahiensis." The type in the Munich Herbarium, with the name in Nees script, was collected by Martius. It consists of four plants, two pubescent and two glabrous, corresponding to the two forms into which Nees divides the species, α , with glabrous foliage, and β , with softly villous foliage.

Paspalum campestre Trin. Mém. Acad. St. Pétersb. VI. 3²: 144. 1834. "V. spp. Bras." The type in the Trinius Herbarium is labeled "in campis siccis arenosis, pr Ilheos, Brasil, Langsdorf." The foliage is densely pubescent.

Panicum bicrurulum Salzm.; Steud. Nom. Bot. 2: 253. 1841. "Bahia." Name only, doubtless an error for *Paspalum bicrurulum* Salzm.

Paspalum bicrurulum Salzm.; Steud. Nom. Bot. 2: 270. 1841. "Bahia" Name only. Steud. Syn. Pl. Glum. 1: 21. 1854. "Hrbr. Bahiense." A Salzmann specimen bearing the name in his script and also a note in Steudel's script, "*Paspalum bicrurulum* Salzm. species distincta," is in the Lenormand Herbarium at Caen. This plant is geniculate below and appears to be the basis of Steudel's description. It is *P. pumilum*, as noted by Doell on the label. Three species were distributed by Salzmann bearing this name: *P. pumilum*, *P. multicaule*, and the species related to *P. pumilum* but with appressed-hispid spikelets which Doell⁸¹ describes as *P. bicrurulum* Salzm., based on Salzmann's species in part. Steudel describes the spikelets as glabrous, hence it is necessary to refer *P. bicrurulum* to *P. pumilum*. The specimen in the Delessert Herbarium and part of that in the United States National Herbarium belong to the species having appressed-hispid spikelets; all the others so named which have been examined are either *P. pumilum* or *P. multicaule*. In Salzmann's own herbarium in Montpellier is a specimen of the species with appressed-hispid spikelets, with a varietal name added by Salzmann to *Paspalum bicrurulum*. Doell suggests that *P. strigosum* would be a better name for the species with appressed-hispid

spikelets than *P. bicrurulum*, because Salzmann confused two species under that name. Since the species is without a name otherwise, *P. strigosum* Doell (Mart. Fl. Bras. 2²: 58. 1877), based on *P. bicrurulum* Salzm.; Doell, not Salzm.; Steudel, 1854, may be taken up for this apparently rare species. The only known collection, other than Salzmann's, is Chase's no. 7885 from Bahia.

DESCRIPTION

A low perennial in dense tufts, the rhizomes, if any, short, slender, and nearly

vertical; culms slender, simple, 12 to 60 cm. tall (usually 15 to 35 cm.), spreading to ascending, glabrous, flattened; leaves crowded at the base, from nearly glabrous to densely pubescent throughout, and grayish olivaceous or purplish, the subcompressed overlapping sheaths successively longer, pubescent at least on the

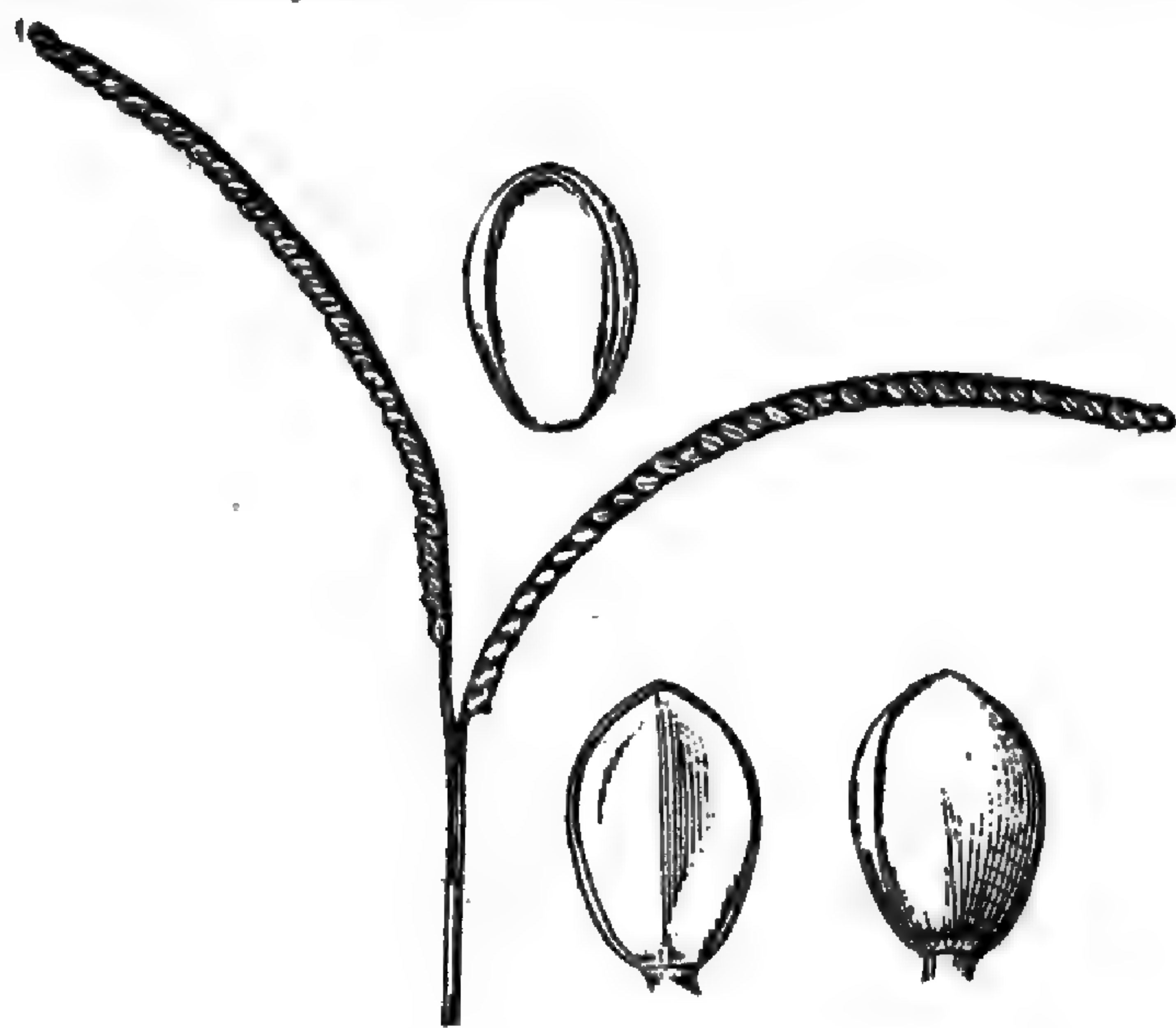


FIGURE 34.—*P. pumilum*. From type specimen and Hitchcock 10350

⁸¹ Mart. Fl. Bras. 2²: 57. 1877.

margin, the upper leaves with long sheaths and short or obsolete blades; ligule membranaceous, about 0.5 mm. long, with a dense row of hairs back of it; blades flat, ascending, 1.5 to 12 cm. long, 2 to 7 mm. wide, linear-elliptic to linear, less firm than in the preceding; racemes 2, subconjugate (rarely 3), recurved-ascending, 2 to 7 cm. long, slender; rachis about 0.6 mm. wide, glabrous; spikelets solitary 1.6 to 2 mm. long, 1.1 to 1.3 mm. wide, not shining, otherwise as in the preceding.

DISTRIBUTION

Sandy savannas and moist open ground mostly at low altitudes, Dominica and Trinidad to Colombia, Uruguay and Chile.

LEEWARD ISLANDS: Dominica, *Jones* 39.

TRINIDAD: Piarco Savanna, *Hitchcock* 10350; *Warming* 808. Valencia, *Broadway* 6946.

COLOMBIA: Buenaventura, *Hitchcock* 19907. Córdoba, *Pittier* 540.

BRITISH GUIANA: Lama Stop-off, *Hitchcock* 16899, 16973, 17011, 17012. Lama Dam, *Jenman* 6015. Penal Settlement, *Hitchcock* 17028. Bartica, *Hitchcock* 17260, 17269. Wismar, *Hitchcock* 17280. Akyma, *Hitchcock* 17433.

BRAZIL: Pernambuco, *Chase* 7727, 7761. Bahia, *Salzmann*. Cachoeira, *Chase* 8081. Parafuso, *Chase* 7983. Ouro Preto, *Chase* 9374. Juiz de Fôra, *Chase* 8586. Alto da Serra, *Chase* 9768. Pico de Tijuca, *Chase* 8492. Novo Friburgo, *Glaziou* 4307. Rio de Janeiro, *Chase* 8172, 8234, 8438, 8443. Campos do Jordão, *Chase* 9895. Ypiranga, *Dusén* 3986. São Leopoldo, *Dutra* 599. Without locality, *Beyrich*; *Riedel* 964.

URUGUAY: Montevideo, *Arechavaleta* 79 in 1874, 2 in 1890; *Berro* 6733; *Marsh* 51.

CHILE: Valdivia, *Buchtien* in 1898.

34. *Paspalum subciliatum* Chase

Paspalum subciliatum Chase, Journ. Washington Acad. Sci. 17: 144. f. 1. 1927. "Type in the U. S. National Herbarium, no. 734821, collected in a savanna, in the vicinity of Balboa, Canal Zone, September 6, 1911, by A. S. Hitchcock (no. 8017)."

DESCRIPTION

A tufted perennial, leafy below; culms erect and crowded from a short horizontal rhizome, the innovations short and subglobose, resembling bulblets at the base of flowering culms; culms simple, 15 to 45 cm. tall, slender, compressed, striate, glabrous; sheaths glabrous or with a few hairs on the margin at the summit, the lower mostly short and crowded, the upper one elongate and bladeless; ligule ciliate, about 0.5 mm. long; blades erect, folded at base and slightly wider than the sheath, flat above, drying more or less involute with attenuate tip, 10 to 20 cm. long, 2 to 3 mm. wide (or occasional lower ones 5 to 8 cm. long and 5 mm. wide), long-pilose on the upper surface toward the base, otherwise glabrous; racemes 2, conjugate (rarely a third below), narrowly ascending to spreading, 3 to 6.5 cm. long, one usually a little longer and naked at the very base; rachis slender, flexuous, with a dense tuft of short.

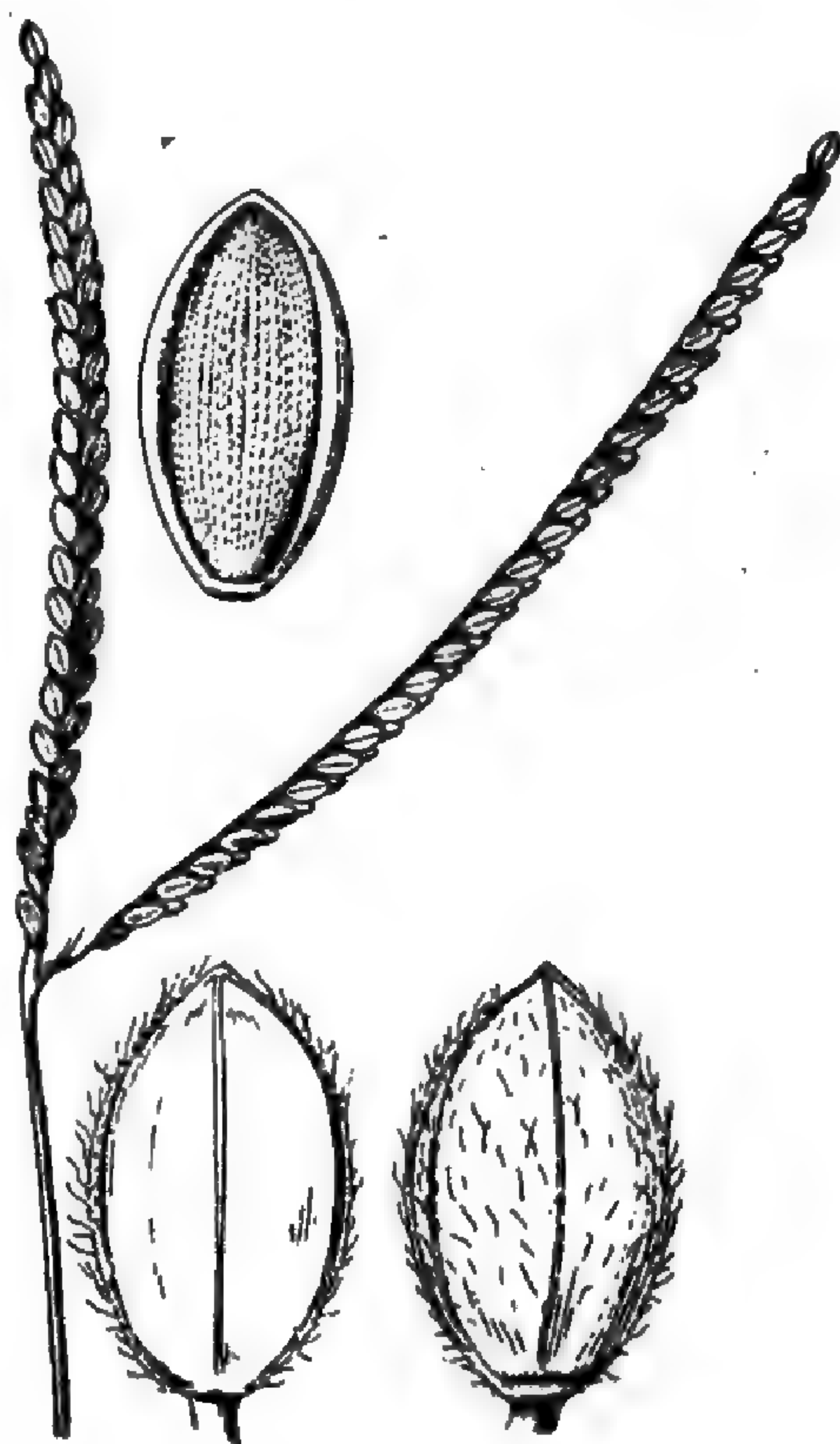


FIGURE 35.—*P. subciliatum*. From type specimen

white hairs at base, otherwise glabrous, purplish; spikelets grayish green, solitary, subsessile, scarcely or not at all imbricate, elliptic, subacute, 2.2 to 2.4 mm. long, 1.2 to 1.5 mm. wide; glume and sterile lemma equal, covering the fruit, 3-nerved, the glume minutely pubescent, the hairs longer around the margin, the sterile lemma ciliate toward the summit, otherwise glabrous; fruit pale, very minutely papillose-striate.

DISTRIBUTION

Open savannas, Panama and Brazil.

PANAMA: Dolega, *Hitchcock* 8339. Canal Zone, *Hitchcock* 8017. Chepo, *Pittier* 4500.

BRAZIL: Rio Branco, Amazonas, *Kuhlmann* 3170.

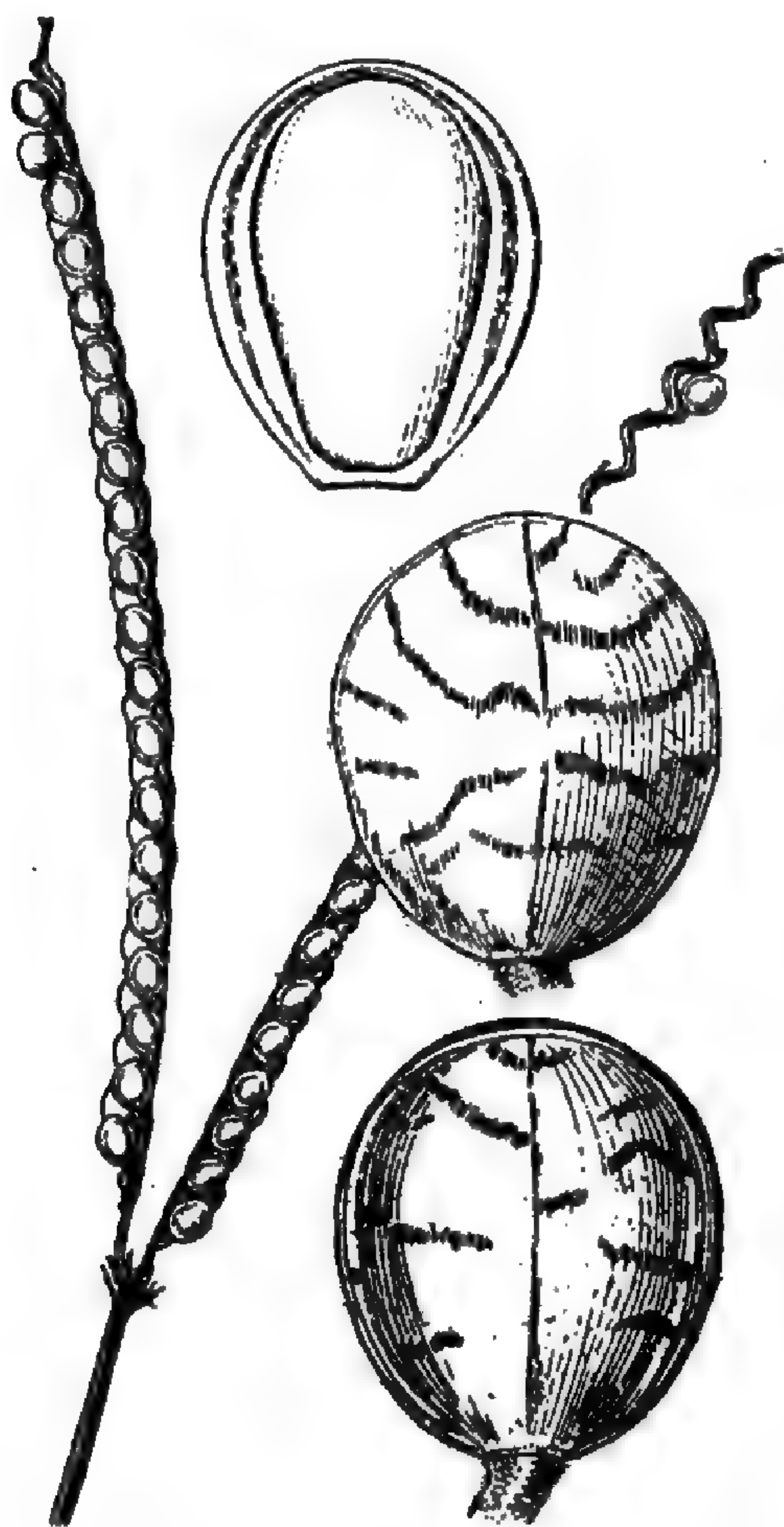


FIGURE 36.—*P. serpentinum*. From type specimen and *Hitchcock* 10337

35. *Paspalum serpentinum* Hochst.

Paspalum serpentinum Hochst.; Steud. Syn. Pl. Glum. 1: 22. 1854. "Hrbr. Kappler nr. 1561 * * * Surinam." This collection, from the Steudel Herbarium, is in the Drake Herbarium at Paris. Another, bearing the name in Steudel's script, is in the Lenormand Herbarium at Caen. A second specimen in the Drake Herbarium is named *Paspalum maculosum* β *rotundiflorum* in Doell's script. In these specimens the lower sheaths are conspicuously villous.

Paspalum argyrocondylon Steud. Syn. Pl. Glum. 1: 22. 1854. "Hrbr. Paris et Lenorm. Guiana." The specimen in the Lenormand Herbarium at Caen, bearing the name in Steudel's script, consists of a culm lacking the base, the sheaths pilose toward the summit. It is labeled "Guiana nr. 11," no collector's name being given.

Paspalum maculosum var. *rotundiflorum* Doell in Mart. Fl. Bras. 2³: 72. 1877. Based on *P. serpentinum* Hochst.

DESCRIPTION

A slender cespitose perennial, leafy at the base, the culms naked above; culms simple, erect, 50 to 60 cm. tall, sulcate in drying, glabrous; nodes glabrous; lower sheaths and blades crowded, densely grayish villous, the upper sheaths glabrous, bladeless or nearly so; ligule membranaceous, brown, scarcely 0.5 mm. long; blades firm, flat or involute, erect or the lowermost spreading, 6 to 40 cm. long, 3 to 5 mm. wide, the nerves prominent on the minutely puberulent upper surface; racemes 2, subconjugate, 6 to 8 cm. long, ascending; rachis slender, flexuous, minutely puberulent, bearing a tuft of shining white hairs at base; spikelets solitary, relatively long-pediceled, 2.6 mm. long, 2.2 to 2.3 mm. wide, suborbicular, the face slightly convex with a submarginal furrow on each side, the margin flat; glume and sterile lemma equal, faintly 3-nerved, glabrous, yellowish brown, with irregular transverse markings of dark brown; fruit stramineous, 2.5 mm. long, 2 mm. wide, broadly obovate, the palea slightly convex, the lemma with a submarginal furrow.

DISTRIBUTION

Wet sandy savannas, Trinidad and the Guianas.

TRINIDAD: Piarco Savanna, *Hitchcock* 10337.

BRITISH GUIANA: Rupununi Savanna, *Melville*.

DUTCH GUIANA: "Surinam," *Kappler* 1561.

Linearia.—Perennial; culms slender tufted; blades narrow; racemes 2; spikelets narrowly elliptic. But one species in North America.

36. *Paspalum lineare* Trin.

Paspalum lineare Trin. Gram. Pan. 99. 1826. "V. spp. Brasil. (Langsdorff.)." The type specimen in the Trinius Herbarium was examined by A. S. Hitchcock. The spikelets are 4.2 to 4.4 mm. long. The first glume is developed in several of the spikelets as noted by Trinius; in one it is three-fourths as long as the spikelet. The racemes are 4 and 4.5 cm. long in the fragment of the type given to the United States National Herbarium, though Trinius' description gives the length as an inch "(pollicaribus)." The blades are glabrous as described and 0.5 mm. wide as folded. Trinius' type of *P. lineare* would seem to be one of the specimens cited by Nees as *P. angustifolium*, "Serra da Lapa dicti prov. Minarum (α Langsdorff.)," α referring to the species itself not "β glumis transversum undulatis." Nees cites "*Paspalum lineare*, Trin. ined." as a synonym of his *P. angustifolium* (though Trinius' work appeared in 1826 and Nees' in 1829). Trinius applies Nees' name *P. angustifolium* "ined." to the plant with cross-wrinkled spikelets which Nees himself referred to *P. angustifolium* "β glumis transversim undulatis." That species is not known from North America. Trinius later⁸² recognized the error and states that the form he described under *P. angustifolium* Nees seems to be a distinct species. His plate 111 (an excellent figure of *P. lineare*) is entitled "*Paspalum angustifolium*," though the description is headed "*Paspalum lineare*."

Paspalus angustifolius Nees, Agrost. Bras. 64. 1829. Not *Paspalum angustifolium* LeConte 1820, nor Nees; Trin. Gram. Pan. 99. 1826. "*Paspalum lineare*, Trin. ined. * * * Chapada do Paranán dictis versus Contagem de S. Maria, et ad Flumen formosum provinciarum Goyazanae et Minarum (Martius); ad Fazenda do Borrachudo. Brasiliae (Sellow); * * * Serra da Lapa dicti prov. Minarum (α Langsdorff.) * * * V. et in Herb. Reg. Berol. et in Herb. Acad. Imp. Petrop. et Trin." In the Munich Herbarium is a specimen collected by Martius with the data "Paranan et Rio Fermoza," which is named "*Paspalus angustifolius* v. β" in Nees' script. A second sheet with the same name "v. β" in Martius' script bears the data "Chapada do Paranam * * * S. Maria & fl. formosam. Goyaz & Minarum." These specimens agree with Nees' description of *P. angustifolium* itself, not with that of var. "β glumis transversim undulatis." The name in Nees' script is on a little slip, not on the label with the locality. It seems probable that this slip was misplaced. The Martius collection of var. β as described was not found in the Munich Herbarium but was found by A. S. Hitchcock in the Trinius Herbarium marked "*Paspalum angustifolium* N. Es. in Brasilia, mis. auctor." Trinius⁸³ described this as "*Paspalum angustifolium* N. ab Es! in Mart. Fl. Bras. ined." with a note that the name should be changed because of *P. angustifolium* LeConte. The plant is the same as *P. approximatum* Doell; it is not found in North America. Because of the confusion both of Martius' collections are rejected as the type of *P. angustifolium* Nees. In the Berlin Herbarium is a specimen

⁸² Icon. Pl. 111. 1828.

⁸³ Gram. Pan. 99. 1826.

with a label in Nees' script "*Paspalus angustifoli* N. ab E. Sellow Brasilia," with a second slip in Nees' script "*Pasp. angustifolius* v. *a*," written above another name which had been scratched out, and with a third slip in Kunth's script "*Pasp. angustifolius* Nees ab Esenb." This specimen agrees with Nees' description and is taken as the type. The upper part of the sheaths and lower part of the very slender blades are pilose; the spikelets are about 4.3 mm. long; a minute first glume is developed in several of them. Two of the culms bear three racemes. A second sheet of apparently the same collection bears a Sello field label "Faz. do Buraxudo 7 Dbr. 18." This bears in Nees' script the unpublished name crossed out in the label on the other sheet.

Paspalum neesii Kunth, Rév. Gram. 1: 25. 1829. "(*Paspalum angustifolium* Nees ab Esenb.)." Kunth does not specify whether it is *P. angustifolium* Nees in Trin. 1826, or of Nees himself, 1829, that he is changing. Since Kunth published the change in 1829 it would seem as if he must have had the earlier name in mind, but his writing on the Nees' specimen in Berlin (see above) shows that he knew Nees' 1829 species as *P. angustifolium*.

Panicum furcellatum S. Moore, Trans. Linn. Soc. London. Ser. 2. 4: 505. pl. 34. 14-22. 1895. "Santa Cruz * * * (N. 763)" Moore, Matto Grosso,

Brazil. The type specimen, collected by Moore, was examined in the herbarium of the British Museum. The sheaths are from sparsely appressed-hirsute to glabrous, hairy at the mouth, the upper almost glabrous; the blades are coarser than in the types of *P. lineare* and *P. angustifolium*, being 1.5 mm. as folded. The spikelets are 4 to 4.1 mm. long; the first glume is well developed in about one-third of the spikelets.

DESCRIPTION

A slender, densely caespitose perennial, the base usually clothed with old shredded sheaths; culms simple, stiffly erect, compressed, glabrous, 40 to 80 cm. tall; nodes densely appressed-pubescent with short white hairs; basal leaves several to many, with compressed, often somewhat equitant, overlapping sheaths 6 to 10 cm. long, pilose to subglabrous, usually conspicuously hairy at the summit, their blades conduplicate,

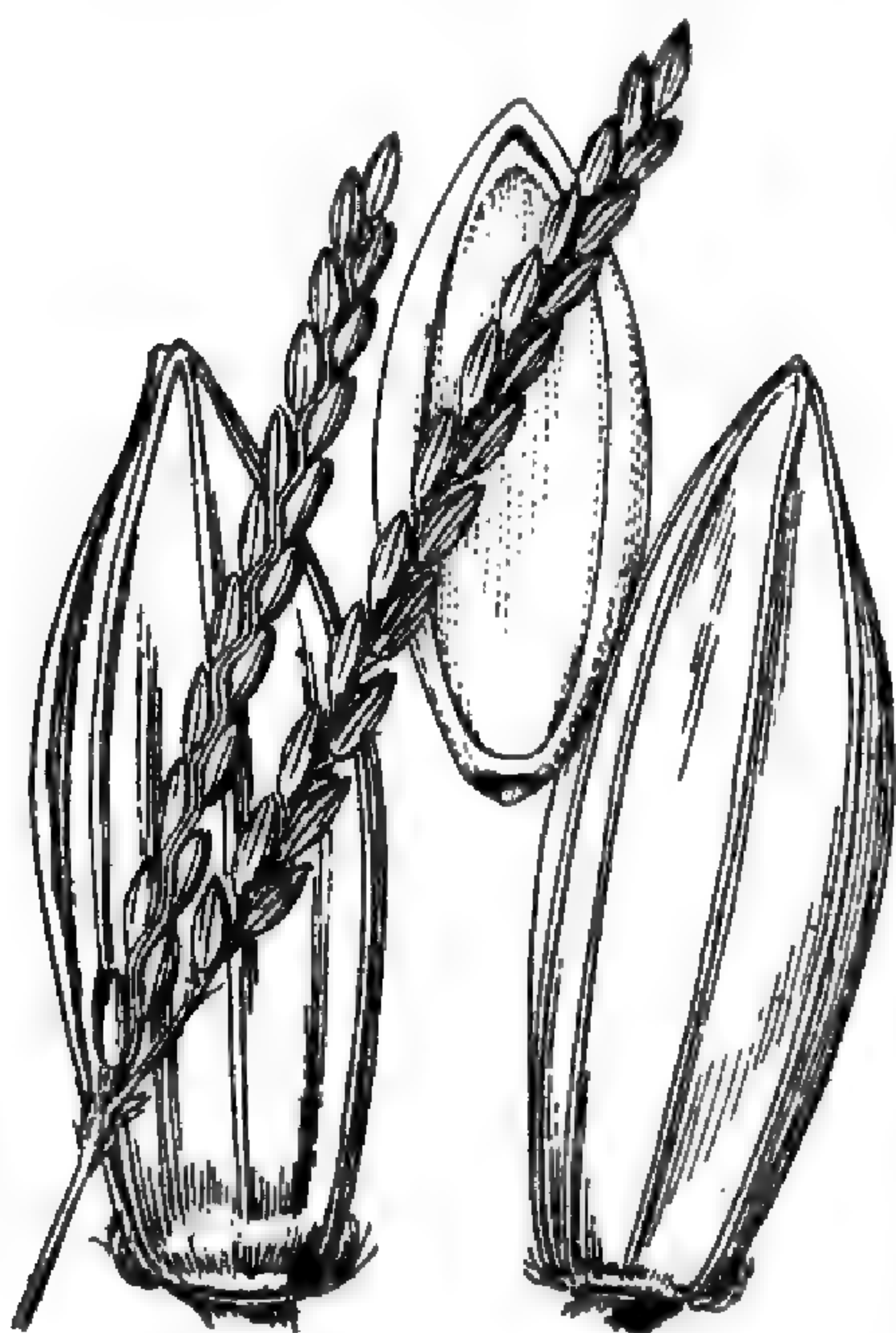


FIGURE 37.—*P. lineare*. From type specimen and Glaziov 22493

the upper surface grown together except at the very base, as much as 50 cm. long or more, erect or nearly so, 0.5 to 1.5 mm. wide as folded, narrower at base than the summit of the sheath, densely pilose on the inner surface at base; culm leaves usually 3, the sheaths shorter than the elongate internodes, glabrate or nearly so except at the summit; ligule membranaceous, minute; blades like those of the basal leaves, 5 to 30 cm. long, the uppermost reduced to a subulate tip; inflorescence of two (rarely 3) erect or slightly spreading approximate but not conjugate racemes 3 to 5.5 cm. long, the common axis 3 to 10 mm. long; rachis slender, flexuous, rarely narrowly winged, long-pilose at the base, otherwise glabrous, that of the upper raceme often naked at base for 5 to 10 mm.; pedicels from minute to 1 mm. long; spikelets solitary, scarcely or not at all imbricate, erect, 4 to 4.5 mm. long (rarely longer) 1.5 to 1.8 mm. wide, elliptic, with a short tuft of white hairs on either side at the very base, otherwise glabrous (rarely with a few hairs along the margin of the glume); glume and

sterile lemma 5 nerved, covering the fruit and pointed beyond it; fruit pale, 3.8 to 4.3 mm. long, about 1.4 mm. wide, minutely and striately papillose-roughened.

This species is variable in the pubescence of the foliage and the size of the spikelets. In Hitchcock & Chase's Grasses of the West Indies⁸⁴ the more slender Cuban plant with spikelets not more than 4 mm. long and with subglabrous foliage was described as *Paspalum neesii* Kunth. Further study of more material shows no dividing line between the form with larger spikelets and that with usually smaller spikelets. As shown above, the types of *P. lineare* and *P. angustifolium* alike have very slender blades and spikelets more than 4 mm. long, the only difference being that in *P. angustifolium* the blades are pilose below. The Cuban specimens have coarser nearly glabrous blades and mostly spikelets not more than 4 mm. long. In Britton, Britton & Wilson 15114 the spikelets are 4 to 4.2 mm. This is the commoner form of Brazil, though specimens cited below show variation from blades 0.5 as folded to 1.5 as in Cuban specimens, and from glabrous to hirsute. The first glume is frequently developed in a few spikelets of a raceme.

The copious basal foliage is commonly burned off to a height of 10 to 15 cm. Tonduz's no. 6548 is exceptional in having spikelets 5 mm. long, the glume obscurely ciliate on the margin about halfway to the summit.

Doell⁸⁵ uses the name *P. neesii* Kunth for this species, giving *P. lineare* Trin. as a synonym followed by the note "(varietas grandiflora)."

DISTRIBUTION

Savannas, Costa Rica and Cuba to Argentina.

COSTA RICA: Cabagra, Tonduz 6548.

CUBA: Herradura, Baker 3459; Ekman 10737. Between Zarzal and Nagua, Léon 11336; Ekman 14146. Isle of Pines, Britton, Britton & Wilson 15114; Curtiss 379.

BRAZIL: Est. Minas Geraes, Glaziou 17375; Widgren 870. Capelinha de Santo Antonio, Glaziou 22493. Cabeceiras do Cantario, Kuhlmann 1698. Tamanduá, Dusén 10834. Southern Brazil, Sello. Without locality, Glaziou 15633, 22474, 22476.

PARAGUAY: Between Río Apa and Río Aquidaban, Fiebrig 4996. Sierra de Amambay, Hassler 10775, 11639.

ARGENTINA: Río Paraná, Chaco. Muello (*Herb. Parodi*) 4703.

Setacea.—Perennial from a knotted base or very short rhizomes; culms compressed; ligule a minute membrane with a dense row of long white hairs back of it; blades flat; inflorescence terminal and axillary, the racemes slender, mostly subcylindric, the spikelets in pairs (or the lower occasionally undeveloped), crowded, strongly plano-convex; fruit nearly the size and form of the spikelet, smooth and shining. The first glume is developed in occasional specimens, more frequently so than in most groups of the genus, other than Decumbentes.

Most of the species of this group are rather poorly defined and appear to intergrade. Pubescence is extremely variable in amount and position, and the spikelets vary in size and shape. Those on a single plant are nearly uniform in length but vary in width and form in a single raceme. Where several names have been reduced to synonymy, as in *Paspalum ciliatifolium*, the characters of each type are given. Those that do not agree with the writer may therefore

⁸⁴ Contr. U. S. Nat. Herb. 18: 311. 1917.

⁸⁵ Mart. Fl. Bras. 2²: 83. 1877.

apply these names to such specimens as chance to have the particular characters found in the different type specimens. Intergrading forms have been maintained as species when much the greater part of the material studied is definitely referable to one or the other.

Several of the type specimens of this difficult group are fragmentary or are mixtures of two or three species. Of mixtures that element has been chosen for type that accords with the concept that has grown up about the name in question. (See *Paspalum longepedunculatum* and *P. ciliatifolium*.)

Spikelets not more than 1.8 mm. long (or sometimes 1.9 in *P. debile* and *P. propinquum*), usually 1.5 to 1.7 mm. (See also exceptional *P. ciliatifolium*.)

Blades conspicuously ciliate, otherwise nearly glabrous.

Blades relatively short, rounded at base and recurved-ascending; foliage aggregate toward the base, the upper culm relatively naked; spikelets glabrous, mostly 1.5 to 1.6 mm. long-----37. *P. longepedunculatum*.

Blades mostly elongate, suberect, not aggregate toward the base; spikelets pubescent, 1.7 to 1.9 mm. long-----45. *P. propinquum*.

Blades and sheaths conspicuously pubescent throughout.

Culms slender, erect or suberect; foliage not aggregate at base; blades suberect, usually not more than 5 mm. wide-----38. *P. setaceum*.

Culms stouter, mostly spreading; foliage more or less aggregate at base; blades spreading, usually more than 5 mm. wide-----39. *P. debile*.

Spikelets 2 to 2.5 mm. long (or 1.8 to 1.9 mm. in *P. ciliatifolium* and *P. propinquum*.)

Foliage, except margins, glabrous as a whole or nearly so (sparsely pubescent in exceptional *P. ciliatifolium* and lower sheaths usually pubescent in *P. rigidifolium*.)

Blades stiff, usually not more than 6 mm. wide; spikelets mostly 2.2 to 2.4 mm. long-----46. *P. rigidifolium*.

Blades from lax to rather firm, if firm more than 6 mm. wide; spikelets not more than 2.1 mm. long.

Spikelets mostly 2 mm. long, rounded at summit; blades mostly more than 8 mm. wide-----44. *P. ciliatifolium*.

Spikelets 1.8 to 1.9 mm. long, slightly pointed; blades not more than 8 mm. wide-----45. *P. propinquum*.

Foliage conspicuously pubescent (or sparsely so in exceptional specimens of *P. pubescens*).

Culms erect or nearly so.

Blades from sparsely to rather densely pilose, rather thin.

43. *P. pubescens*.

Blades puberulent on both surfaces with long hairs intermixed or the lower surface nearly or quite glabrous except for a few long hairs along midrib and margin, usually rather firm-----42. *P. stramineum*.

Culms widely spreading or prostrate.

Foliage coarsely hirsute; plants commonly relatively stout.

40. *P. supinum*.

Foliage finely puberulent; plants usually grayish olivaceous.

41. *P. psammophilum*.

37. *Paspalum longepedunculatum* LeConte

Paspalum debile Muhl. Cat. Pl. 8. 1813; Descr. Gram. 90. 1817. Not *P. debile* Michx. 1803. The type has not been examined. The description applies perfectly to *P. longepedunculatum*.

Paspalum longepedunculatum LeConte, Journ. de Phys. 91: 284. 1820. "*P. debile*, Muhlenberg, gram. Habitat in Carolina boreali." LeConte was obviously

describing his own specimens. He refers *P. debile* Michx. to *P. setaceum* and *P. debile* Muhl. to *P. longepedunculatum*. A specimen bearing the name in LeConte's handwriting but without data is in the herbarium of the Academy of Natural Sciences, Philadelphia. This consists of an entire mature plant of *P. longepedunculatum* and the upper part of a culm of *P. ciliatifolium*. A duplicate in the Drake Herbarium labeled "Am. Sept. LeConte," is *P. longepedunculatum*, while another so labeled in the Paris Herbarium is *P. ciliatifolium*. The complete plant in the herbarium of the Academy of Natural Sciences is taken as the type. This is an exceptional specimen in having three racemes on the primary culm. The spikelets are 1.8 mm. long.

Paspalum setaceum var. *longepedunculatum* Wood, Class-book 782. 1861. Based on *P. longepedunculatum* LeConte.

Paspalum kentuckiense Nash, Britton, Man. 1039. 1901. "Type collected near Poor Fork P. O., Ky., by T. H. Kearney, Jr., Aug. 1893." The type specimen, in the herbarium of the New York Botanical Garden, consists of rather small plants, the axillary peduncles not or scarcely exerted. The spikelets are 1.7 mm. long.

DESCRIPTION

A slender perennial, in tufts of few to several culms, with leafy shoots at the base, relatively naked above; culms ascending or suberect, 25 to 80 cm. tall, glabrous, the internodes finally elongate; nodes dark brown, the lower often geniculate; leaves mostly aggregate at the base, 2 above, the sheaths ciliate on the margin, sometimes obscurely pubescent on the collar, otherwise glabrous or nearly so; ligule a minute brown membrane with a row of stiff white hairs 2 to 3 mm. long back of it; blades commonly conduplicate at base, with a strong midrib, recurved-ascending, flat beyond the base, 4 to 18 cm. long, commonly to 10 cm. long, 3 to 8 mm. wide, rather firm, stiffly papillose-ciliate on the margin, the hairs 1.5 to 3 mm. long, minutely pubescent to glabrous on the upper surface, usually glabrous on the lower but sometimes sparsely pilose along the midnerve or toward the apex; racemes on very slender finally elongate peduncles, 1 or 2, rarely 3, on the primary, 1 on the axillary peduncles, the slender arching racemes 3 to 8 cm. long; rachis slender, minutely pubescent at base; spikelets in pairs on slender scabrous pedicels, crowded, 1.5 to 1.8 mm. long, 1 to 1.2 mm. wide, elliptic-obovate, becoming turgid and blunter at maturity, pale, glabrous; glume and sterile lemma equal, barely covering the fruit at maturity, rather firm, the glume 3-nerved, the lemma 2-nerved, the midnerve suppressed, the lemma and often the glume, sparsely spotted with faint minute depressions; fruit about the size and shape of the spikelet, pale and shining.

The most characteristic form of this species, with short, rather firm, recurved-ascending blades, and spikelets 1.5 to 1.6 mm. long, is found only in Florida. The type specimen, presumably from South Carolina, approaches *P. ciliatifolium*, with which the species seems to intergrade. The type of *P. kentuckiense* is much more characteristic of the species, though the spikelets are 1.7 mm. long and the blades are short-ciliate.

DISTRIBUTION

Sandy soil, mostly in low pine land or "flatwoods," Georgia and Kentucky to Florida and Mississippi.

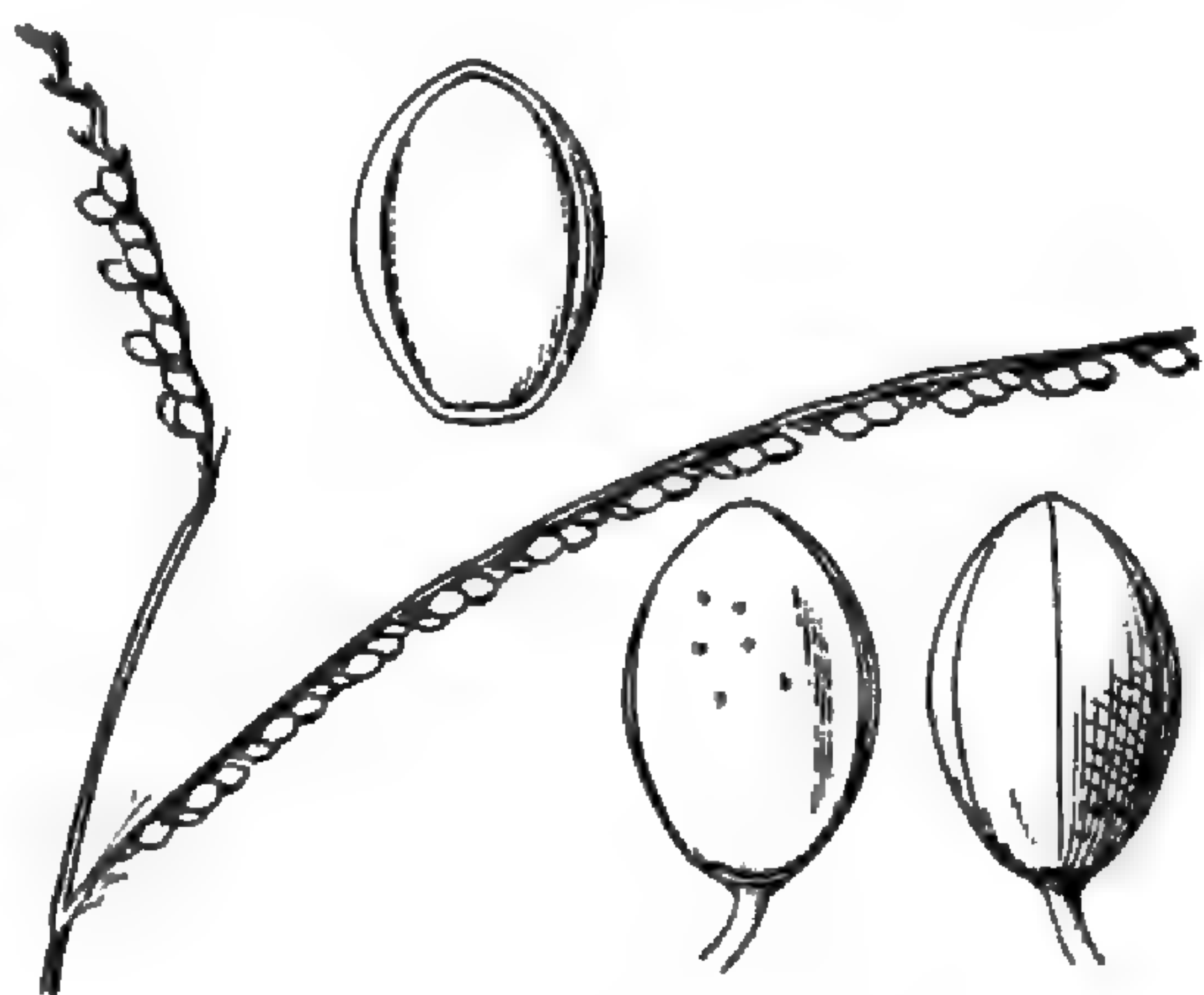


FIGURE 38.—*P. longepedunculatum*. From Nash 2074

GEORGIA: Stone Mountain, *Hitchcock* 206, 2420.

FLORIDA: New River, *Hitchcock* 2492. Apalachicola, *Biltmore Herb.* 815c in part; *Kearney* 97. Madison, *Combs* 229. Lake City, *Combs* 76; *Combs & Rolfs* 105, 121; *Ricker* 888 A. Jacksonville, *Pieters* in 1899. Baldwin, *Combs* 56. Cedar Key, *Combs* 782. Crystal, *Combs* 1020. Eustis, *Chase* 4047, 4048, 4056; *Hitchcock* 2493; *Nash* 1417 in part, 2074. Sanford, *Chase* 4033, 4034, 4035. Titusville, *Chase* 3974, 3987. Brevard County, *Fredholm* 5743. Merritt Island, *Swallen* 177. Kissimmee, *Swallen* 259. Fellsmere, *Tracy* 9383, 9385. Braidenton, *Combs* 1318. Jensen, *Hitchcock* 753½. Fort Myers, *Chase* 4146, 4152, 4167; *Hitchcock* 508, 862; *Standley* 12940, 14830; *J. P. Standley* 180. Marco, *Hitchcock* 2422. Miami, *Chase* 3869, 3886; *Hitchcock* 2423. Homestead, *Hitchcock* 688. Without locality, *Rugel* 442.

KENTUCKY: Poor Fork, *Kearney* 26, 56.

TENNESSEE: Elizabethton, *Hitchcock* 2421.

ALABAMA: Pisgah, *Chase* 4494.

MISSISSIPPI: Moss Point, *Tracy* 4632.

38. *Paspalum setaceum* Michx.

Paspalum setaceum Michx. Fl. Bor. Amer. 1: 43. 1803. "Hab. in aridis Carolinae inferioris." The type in the Michaux Herbarium consists of four incomplete overmature culms, with solitary racemes. Only one spikelet remains, this is glabrous, 1.5 mm. long. The data read "Hab. in aridis apricis Caroline, Georgia." What appears to be a specimen of the same collection is in the herbarium of Drake from the Richard Herbarium. This consists of two better specimens of *P. setaceum* and one of *P. pubescens*.

Paspalum hirsutum Retz. misapplied by Poir. in Lam. Encycl. 5: 28. 1804. "Communiquée par Bosc * * * de la Caroline." The Bosc specimen was examined in the Delessert Herbarium.

Paspalum leptostachyum DC. Cat. Hort. Monsp. 130. 1813. Not *P. leptostachyum* Humb. & Bonpl.; Flüggé 1810. "Hab. * * *" The type specimen, bearing the name in A. P. DeCandolle's script, in the DeCandolle Herbarium, consists of 3 immature flowering culms and a sterile one.

Paspalum incertum Roem. & Schult. Syst. Veg. 2: 308. 1817. Based on *P. leptostachyum* DC., the description of which is copied. A specimen so named in the Berlin Herbarium "Hort. bot. Berol. 1835," is not like DeCandolle's plant but is *Paspalum debile* Michx.

Paspalum eriophorum Willd.; Nees, Agrost. Bras. 56. 1829. Not *P. eriophorum* Schult. 1827. "Willd. Herb.," the native country unknown. The specimen so named in the Willdenow Herbarium bears no data. It is a characteristic specimen of *P. setaceum*.

Paspalum dolichopus Trin.; Steud. Nom. Bot. ed. 2. 2: 271. 1841. Name only, with "*P. eriophorum* Willd. hrb. (non Schult.)" referred to it.

DESCRIPTION

A slender olivaceous perennial in tufts of few to several culms, with numerous leafy shoots with long suberect leaves at base; culms erect or suberect (or, in very large tufts, spreading), 25 to 65 cm., commonly 30 to 50 cm., tall, bearing 1 or 2 slender peduncles at the middle and upper nodes, glabrous; nodes glabrous; sheaths pilose, the upper often nearly glabrous except on the margin; ligule a minute membrane with a dense row of hairs 2 to 3 mm. long, back of it; blades flat, rather firm, erect or nearly so, linear, 5 to 17 cm., commonly 10 to 12 cm., long, 2 to 6 mm. wide, densely pilose on both surfaces and papillose-ciliate on the margin, the upper sometimes short-pubescent only; racemes on very slender peduncles, solitary or sometimes 2, slender, arching, 3 to 9 cm., mostly 5 to 7 cm., long, the rachis pubescent at base, sometimes obscurely so; spikelets in pairs on

slender flat pedicels, the lower of the pair slightly winged at base (the margin of the mid-angle of the rachis extending up the pedicel), crowded, 1.4 to 1.7 mm. long, about 1 mm. wide, elliptic-obovate, turgid at maturity, pale; glume and sterile lemma equal, barely covering the fruit at maturity, the glume 3-nerved, the lemma 2-nerved, or the midnerve rarely developed, both glabrous or, the glume especially, more commonly minutely pubescent, with minutely capitate hairs, often speckled with minute pale brown depressions; fruit about the size and shape of the spikelet, smooth and shining.

DISTRIBUTION

Sandy soil, mostly open woods, of the Atlantic Coastal Plain, Long Island New York, to Florida and Texas; also in Mexico.

NEW YORK: Southampton, *St. John* 2576.

NEW JERSEY: Camden, *Scribner* 25 in 1881. Wildwood, *Chase* 3494; *Pollard* in 1897. Cold Spring, *Pennell* 2155. Sea Island Junction, *Leonard* 2313.

PENNSYLVANIA: Philadelphia, *Smith*.

OHIO: Painesville, *Beardslee*.

MARYLAND: Riverdale, *Chase* 7516. Chesapeake Beach, *Chase* 6136, 7001, 7003.

DISTRICT OF COLUMBIA: Washington, *Vasey* in 1882. Mt. Hamilton, *Killip* 6315.

VIRGINIA: Colonial Beach, *Hubbard* 406. Portsmouth, *Chase* 3685. Dismal Swamp, *Chase* 3650. Virginia Beach, *Hitchcock* 2424. Bedford County, *Curtiss*.

NORTH CAROLINA: Chimney Rock, *Biltmore Herb.* 815b. Elizabethton, *Heller* 14028. Wilmington, *Chase* 7195; *Delile* in 1806; *Hitchcock* 2425. Winter Park Heights, *Chase* 7143. Wrightsville, *Chase* 3122. Craven County, *McCarthy*.

SOUTH CAROLINA: Orangeburg, *Hitchcock* 300, 2426.

GEORGIA: Stone Mountain, *Hitchcock* 2428. De Kalb

County, *Eggert* in 1897. Ruskin, *Ricker* 906. Dock Junction, *Ricker* 967.

FLORIDA: Pensacola, *Combs* 515. Milton, *Swallen* 402, 450. De Funiak Springs, *Combs* 442. Chipley, *Combs* 546, 606. Marianna, *Swallen* 506. Quincy, *Combs* 402. Tallahassee, *Combs* 377; *Kearney* 69. Monticello, *Combs* 345, 350. Madison, *Combs* 232. Suwanee County, *Hitchcock* 2488. Lake City, *Combs & Rolfs* 196; *Hitchcock* 2486. Jacksonville, *Combs* 4; *Curtiss* 5198; *Kearney* 136. Baldwin, *Combs* 64. Levy County, *Hitchcock* 2491. Floral City, *Swallen* 349. Eustis, *Chase* 4046½; *Nash* 1417 in part. Tampa, *Combs* 1374. Bartow, *Combs* 1179.

KENTUCKY: Bell County, *Kearney* 386.

TENNESSEE: Valley Forge, *Hitchcock* 2427. Cocke County, *Kearney* 945.

ALABAMA: Etowah County, *Eggert* in 1899. Auburn, *Pollard & Mazon* 71. Tuskegee, *Carver* 90. Nesheka, *Carver* 6. Tensaw, *Tracy* 8027. Spring Hill, *Bush* 225. Mobile, *Kearney* 47; *Mohr* in 1898.

MISSISSIPPI: Ocean Springs, *Pollard* 1131; *Tracy* 35, 4504. Biloxi, *Tracy* 1893, 1895.

TEXAS: Crystal City, *Tharp* 5235.

TAMAULIPAS: Tampico, *Hitchcock* 5793. Buena Vista, *Wootton* in 1919.

39. *Paspalum debile* Michx.

?*Paspalum dissectum* Walt. Fl. Carol. 75. 1788. Not *P. dissectum* L. 1762. Presumably described from South Carolina. No specimens of *Paspalum* are found in Walter's herbarium.⁸⁶ The description indicates some species of the Setacea group, possibly *P. debile* Michx.

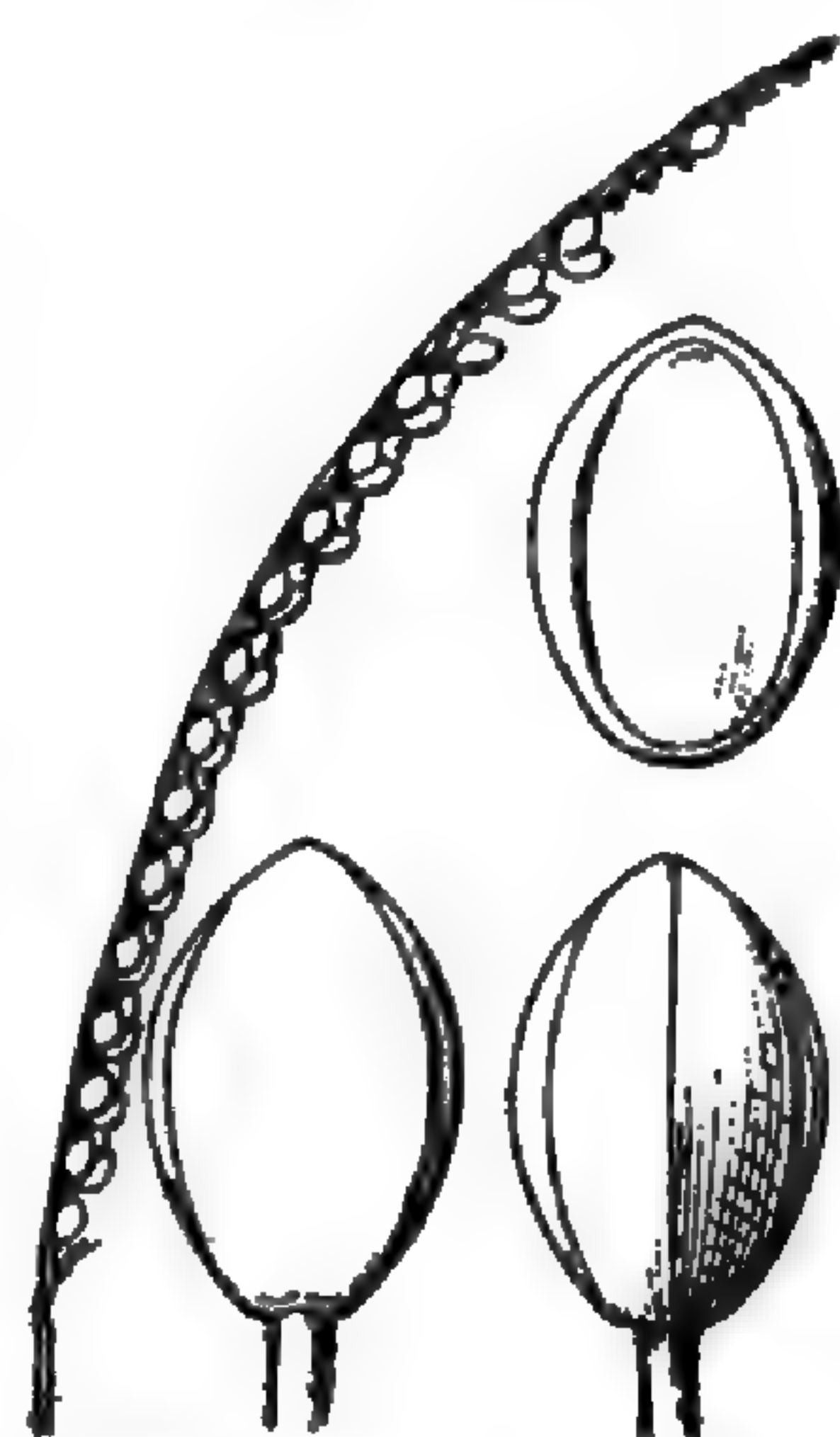


FIGURE 39.—*P. setaceum*
From *Hitchcock* 300

⁸⁶ Hitchcock, Rep. Mo. Bot. Gard. 16: 41. 1905.

Paspalum debile Michx. Fl. Bor. Amer. 1: 44. 1803. "Hab. in maritimis Carolinae et Georgiae." The type in the Michaux Herbarium bears two labels. One, with the name in Michaux's script marked "Hab. in Carolina. No. 1er.," is accompanied by parts of two culms (1) without inflorescence, sheaths and blades densely villous, the blades linear, 13 cm. long and 5.5 mm. wide; and (2) with one inflorescence of two half-included racemes, the spikelets 1.9 mm. long, with obscurely pubescent glume. A third specimen is a single culm of *P. setaceum*. On the second label is written in Michaux's script "*Paspalum debile?* Recolte ici des graines de Caroline." One fragmentary specimen with a single raceme

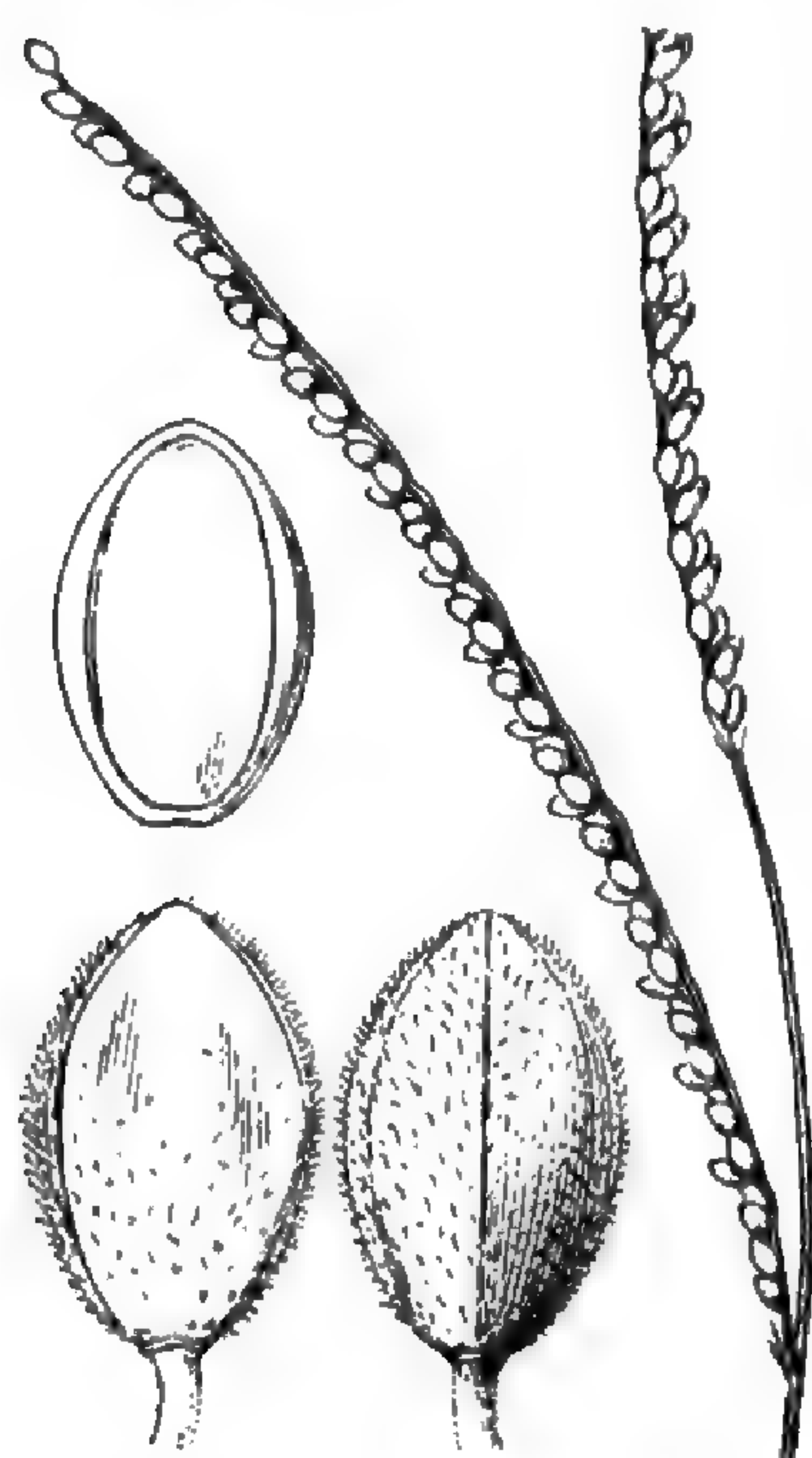


FIGURE 40.—*P. debile*. From type collection of *P. villosissimum*

and glabrous spikelets 1.6 mm. long belongs to *P. setaceum*, the second piece is without inflorescence and is the same as the sterile specimen above the first label. Judging from this second label the plants accompanying it were grown in Michaux's garden from seed from Carolina. The fragments mentioned above as (1) and (2) are taken as the type.

Paspalum dubium DC. Cat. Hort. Monsp. 130. 1813. "Hab. * * * ." The type, in the DeCandolle Herbarium bearing the name in A. P. DeCandolle's script, consists of a single culm with a terminal and 3 axillary inflorescences. There is no locality, but a ticket with "3 3142 27 aout" in what may be Bosc's script.

Paspalum infirmum Roem. & Schult. Syst. Veg. 2: 307. 1817. Based on *Paspalum debile* Michx., the name presumably changed because of *P. debile* Poir. 1804.

Paspalum villosissimum Nash, Bull. Torrey Club 24: 40. 1897. "Type collected [by G. V. Nash] at Eustis, Lake County, Fla., early in June 1894, no. 946, and distributed as *P. setaceum*." This specimen, in the herbarium of the New York Botanical Garden, is a clump with woolly foliage and spikelets 1.8 to 1.9 mm. long.

DESCRIPTION

Closely related to *P. setaceum*, the culms stouter, ascending or spreading, the foliage more aggregate at the base, densely grayish-villous, the more spreading blades as much as 9 mm., commonly 5 to 7 mm., wide; racemes more commonly 2, rarely 3, on the average somewhat longer, the pedicels nearly terete, the spikelets 1.8 to 1.9 mm. long, usually pubescent with minutely capitate hairs, speckled more plentifully than in *P. setaceum*.

Paspalum setaceum and *P. debile* are both variable and appear to intergrade. Michaux differentiates *P. debile* from *P. setaceum* by its weak (instead of erect) culms and its spikelets solitary and puberulent, instead of paired and glabrous. As in all this group the second of the pair of spikelets is sometimes undeveloped.

Several of the Texas specimens and the one from Mexico are much less villous than is typical, the plants, except for the small spikelets and olivaceous color, somewhat resembling *P. stramineum*.

DISTRIBUTION

Sandy mostly dry soil, barrens and flatwoods, Long Island, New York, to Florida and Texas; also in Mexico and Cuba.

NEW YORK: Three Mile Harbor, Latham in 1925.

NEW JERSEY: Atsion, *Commons* 88. Wildwood, *Chase* 3494½. Smithburg, *Pearce* 1884.

NORTH CAROLINA: Winter Park Heights, *Chase* 7144. Greenville, *Chase* 4574.

GEORGIA: Manor, *Tabor* 39.

FLORIDA: Lake City, *Combs & Rolfs* 146. Jacksonville, *Curtiss* 5092 in part. Gainesville, *Combs* 720. Old Town, *Combs* 852, 892. Dunnellon, *Combs* 905. Crystal, *Combs* 1019. Floral City, *Swallen* 341. Eustis, *Chase* 4069; *Nash* 946, 2019. Grasmere, *Combs & Baker* 1034. Pierson, *Dowell* 7344. Lavignes Landing, *Baker* 250. Titusville, *Chase* 3971, 4027. Brevard County, *Fredholm* 5915. Kissimmee, *Swallen* 266. Port Tampa, *Churchill* in 1923. Polk County, *Foote* in 1885. Fort Myers, *Chase* 4169, 4186; *Hitchcock* 509, 854, 2429. Jensen, *Hitchcock* 753.

ALABAMA: Mobile, *Mohr*. Spring Hill, *Langlois* 18.

MISSISSIPPI: Moss Point, *Tracy* 4632. Scranton, *Tracy* 4632a.

LOUISIANA: Covington, *Wurzlów* in 1914.

TEXAS: Gonzales County, *Bogusch* 498, 500. Encinal, *Griffiths* 6383. Torrecillas, *Griffiths* 6431. El Sordo, *Griffiths* 6447. Sarita, *Hitchcock* 2430, 5442.

"Narcoossee," *Ennis* 4 in 1899. Without locality, *Nealley* in 1887.

VERA CRUZ: Vera Cruz, *Orcutt* 2891.

CUBA: Herradura, *Hitchcock* 471. Cojimar, *Ekman* 1094. Santa Fé, *Léon* 8783.

40. *Paspalum supinum* Bosc

Paspalum supinum Bosc; Poir. in Lam. Encycl. 5: 29. 1804. "Communiquée par Bosc, qui l'a recueillie dans la Caroline." Good specimens so named by Bosc are in the Delessert Herbarium, the Willdenow Herbarium, and in the herbaria at Paris and Padua. The one in the Paris Herbarium (since the species was described by Poiret) is probably to be regarded as the type. The spikelets are 2 to 2.1 mm. long, the glume pubescent, the sterile lemma glabrous, the midnerve developed. The plants are smaller than characteristic of this species, the culms being 22 to 30 cm. long.

Paspalum dasyphyllum Ell. Bot. S. C. & Ga. 1: 106. 1816. "Common in cultivated ground," presumably about Charleston, S. C. The type was examined in the Elliott Herbarium. The spikelets are 2 mm. long, the culm about 35 cm. long.

Paspalum setaceum var. *supinum* Trin. Gram. Icon. 2: pl. 130. 1829. Based on *P. supinum* Bosc.

Paspalum ciliatifolium var. *dasyphyllum* Chapm. Fl. South. U. S. ed. 3. 578. 1897. Based on *P. dasyphyllum* Ell.

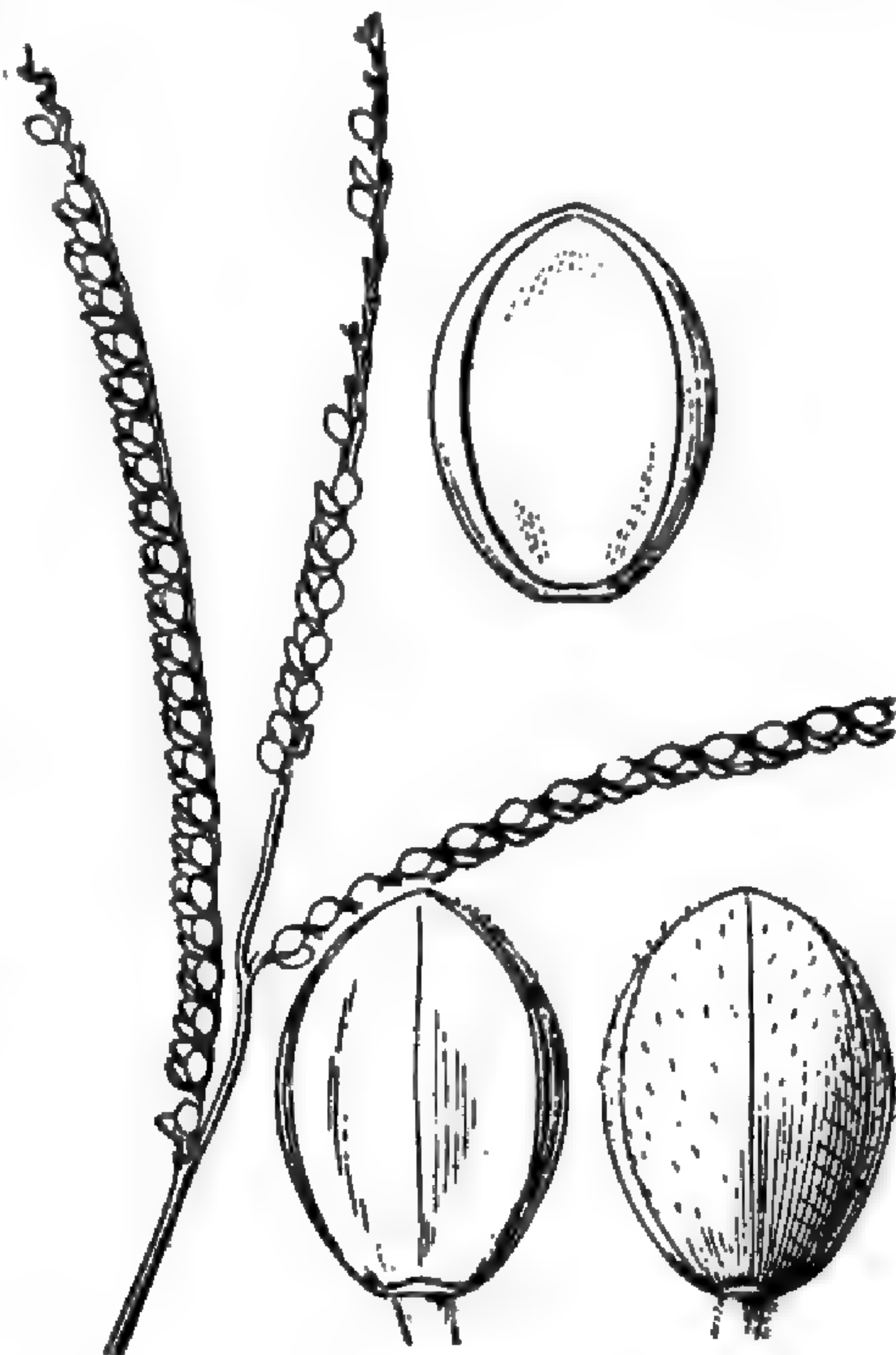


FIGURE 41.—*P. supinum*. From *Chase* 4572

DESCRIPTION

A spreading tufted perennial with olivaceous coarsely pubescent foliage; culms relatively stout, widely spreading, 30 to 90 cm. long, occasionally bearing leafy branches as well as axillary peduncles, glabrous; nodes glabrous; sheaths rather broad, keeled, hirsute, especially on the keel, or sometimes, especially the upper, sparsely appressed-pubescent or nearly glabrate except on the margin, the lower

overlapping; ligule, a minute membrane with a dense row of stiff white hairs about 2 mm. long back of it; blades flat, rather firm, 12 to 30 cm., commonly 15 to 25 cm., long, 8 to 15 mm. wide, scarcely narrowed to the rounded base, hirsute, commonly densely so, on both surfaces, sometimes finely pubescent beneath the long hairs, the margins papillose-ciliate; peduncles mostly less elongate than in related species; racemes commonly 2 or 3, rarely solitary, very rarely 4 to 6, straight or slightly arching, 4 to 9 cm., rarely 12 cm., long, the rachis pubescent at base, rarely with a few stiff hairs on the back, an occasional pedicel also bearing a long hair; spikelets in pairs, crowded, 2 to 2.1 mm. long, about 1.5 mm. wide, elliptic-obovate, turgid, pale; glume and sterile lemma equal, covering the fruit at maturity, 3-nerved or the lemma more commonly 2-nerved, glabrous, or the glume minutely pubescent with capitate hairs, sometimes slightly speckled, the sterile lemma very rarely also pubescent; fruit about the size and shape of the spikelet, yellowish and shining at maturity.

This is the coarsest of the Setacea group.

Small plants with relatively small blades may be distinguished from *Paspalum pubescens* by the dense harsh pubescence, and from *P. debile* by the larger spikelets.

DISTRIBUTION

Dry sandy open ground and old fields, North Carolina to Florida and west to Louisiana.

NORTH CAROLINA: Heiligs Mill, *Small & Heller* 199. Wilmington, *Hitchcock* 312, 2433. Masonboro, *Chase* 4572.

SOUTH CAROLINA: Orangeburg, *Hitchcock* 2434.

GEORGIA: Thomasville, *Tabor* in 1919.

FLORIDA: Florida National Forest, *Chapline (For. Serv.)* 38147. Milton, *Swallen* 423. Santa Rosa County, *Combs* 495. Marianna, *Swallen* 536. Quincy, *Combs* 404. Tallahassee, *Bitting* 833; *Kearney* 71. Monticello, *Combs* 323. Jefferson County, *Hitchcock* 2483. Madison, *Combs* 229½. Suwanee County, *Hitchcock* 2484. Lake City, *Combs & Rolfs* 123, 128, 166; *Hitchcock* 2470, 2485; *Rolfs* 266. Jacksonville, *Curtiss* 5090, 6018; *Hitchcock* 2435. Duval County, *Curtiss* 3576 in part. Gainesville, *Chase* 4197, 4231; *Combs* 719, 755; *Norton* 585b. Old Town, *Combs* 901. Ellzey, *Combs* 808. Floral City, *Swallen* 331. Crystal, *Combs* 1020½. Orange Bend, *Chase* 4117. Eustis, *Chase* 4090; *Hitchcock* 2481, 2482; *Nash* 1418 in part. Eldorado, *Chase* 4124, 4128. Orange City, *Hood* 29. Sanford, *Chase* 4042. Grasmere, *Combs & Baker* 1033. Clarcona, *Meislahn* 170a. Orange County, *Baker* in 1897. Tarpon Springs, *Churchill* in 1923. Hillsborough County, *Fredholm* 6366. Bartow, *Combs* 1175. Manatee, *Rugel* 183. Fort Myers, *Chase* 4138, 4147, 4178; *Hitchcock* 2436. Miami, *Chase* 3862. Dade County, *Small, Mosier & Small* 6458, 6519.

TENNESSEE: Madisonville, *Kefauver*. Laverne, *Eggert* in 1897.

ALABAMA: Mobile, *Mohr* in 1883.

MISSISSIPPI: Biloxi, *Tracy* 3662. Ocean Springs, *Tracy* 121. Petit Bois Island, *Tracy* 4631.

LOUISIANA: Lake Charles, *Chase* 6075.

41. *Paspalum psammophilum* Nash

Paspalum prostratum Nash in Britton, Man. 74. 1901. Not *P. prostratum* Scribn. & Merr. 1901 (earlier than the preceding.) "Southeastern N. Y. to Del." The specimen marked "Type" in Nash's script, collected at Kingsbridge, N. Y., September 13, 1896, by G. V. Nash, no. 514, is in the herbarium of the New York Botanical Garden. It is a tuft of 5 culms with mature raceme.

Paspalum psammophilum Nash in Hitchc. Rhodora 8: 205. 1906. Based on *P. prostratum* Nash, 1901.

DESCRIPTION

A spreading perennial in tufts with prostrate culms forming dense mats, grayish olivaceous; culms 25 to 100 cm. long, glabrous; nodes appressed-pubescent or the upper nearly glabrous; sheaths rather broad, softly appressed-pubescent or the upper nearly glabrous except along the margin; ligule almost obsolete, the dense row of hairs back of it about 2 mm. long; blades flat, rather firm, 4 to 16 cm. long, 4 to 11 mm. wide, rounded at base, softly and densely appressed-pubescent on both surfaces, occasionally with a few long hairs as well, the margins usually sparsely papillose-ciliate; racemes 1 to 3, commonly 2, slightly arching, 4 to 9 cm. long, the terminal exserted on a slender peduncle, the axillary on short peduncles, wholly or partly included in the sheaths, often 2 to a sheath, the peduncle of the terminal, and sometimes the internodes of the culm, often looped near their base out of the sheath (evidently confined in the sheath during growth); rachis 1 mm. wide, slightly winged, short-pubescent at base; spikelets in pairs, crowded on flat pedicels, the lower often winged at base, 2 mm. long, about 1.7 mm. wide, suborbicular, the glume slightly shorter than the sterile

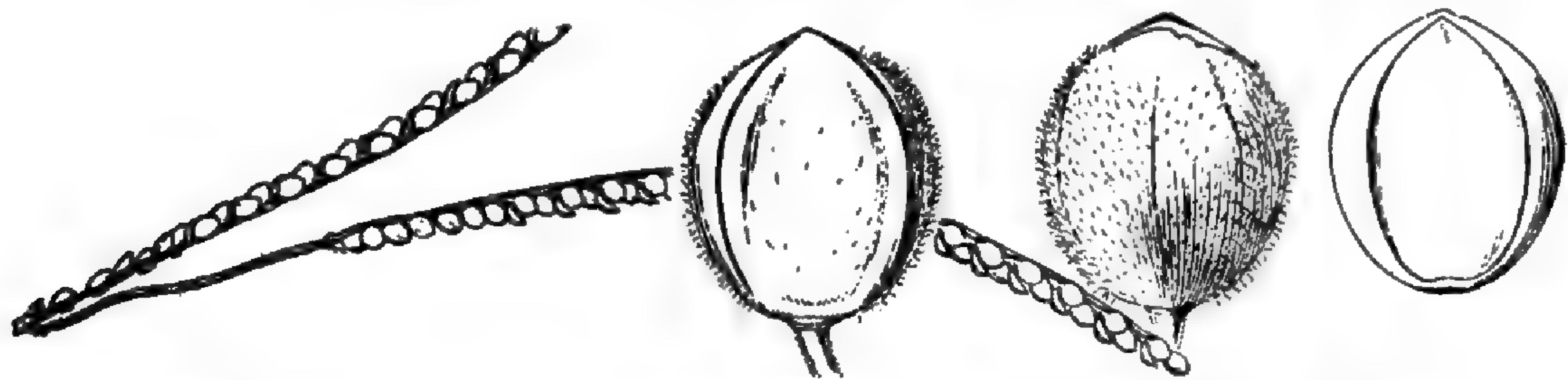


FIGURE 42.—*P. psammophilum*. From type specimen and Graves, New York, in 1898

lemma, 3 to 5 nerved, densely short-pubescent (the hairs scarcely capitate) or glabrous at the hyaline, somewhat erose summit; sterile lemma commonly, 2-nerved, very sparsely pubescent; fruit about the size and form of the spikelet yellowish, smooth and shining.

The spikelets of the axillary racemes are cleistogamous.

DISTRIBUTION

Dry sandy soil, mostly near the coast, Massachusetts to New Jersey.

MASSACHUSETTS: West Barnstable, Knowlton in 1911. Marthas Vineyard, Flynn in 1899.

RHODE ISLAND: Warwick, Spalding in 1916. Block Island, Fernald & Long 8498. Without locality, Congdon.

CONNECTICUT: Stamford, White in 1919. Sprague, Graves 240, 255; Woodward in 1913. Old Saybrook, Bissell in 1904.

NEW YORK: Bay View, Latham 3520. Shinnecock Hills, House 9750. Fishers Island, Graves in 1898. Gardiners Island, Dobbin 15.

NEW JERSEY: Stockton, Fisher in 1897. Atco, Commons 232. Atsion, Chase 3568. Camden, Scribner in 1882

42. *Paspalum stramineum* Nash

Paspalum stramineum Nash in Britton, Man. 74. 1901. "Neb., Kans. and Ind. Terr." The specimen marked "Type" in Nash's script, collected on Middle Loup River, near Mullen, Hooker County, Nebr., July 19, 1893, by P. A. Rydberg, no. 1582, in the herbarium of the New York Botanical Garden, is a mature

plant with blades glabrous or nearly so beneath, puberulent and sparsely pilose above, and spikelets glabrous or obscurely pubescent. The upper of the axillary racemes is partly exserted, the lower included in the sheath.

Paspalum bushii Nash in Britton, Man. 74. 1901. "In dry soil, Mo." The specimen marked "Type" in Nash's script, collected at Bernie, Mo., August 2, 1895, by B. F. Bush, no. 730, in the herbarium of the New York Botanical Garden, consists of two tall plants with blades densely puberulent on both surfaces and sparsely long-pilose as well on the upper, and terminal racemes of pubescent spikelets. The axillary racemes are wholly inclosed in the sheaths.

Paspalum stramineum and *P. bushii* are published on the same page, the first above. "Priority of position" has little weight, since it is not priority in time;

but the larger number of collections are the less pubescent form like the type of *P. stramineum*, the type of *P. bushii* being an extremely pubescent form relatively infrequent.

DESCRIPTION

A slender yellowish-green perennial, in tufts of few to several culms, erect or nearly so, or rarely spreading; culms 40 to 100 cm. tall, glabrous; nodes obscurely appressed-pubescent or glabrous; sheaths rather broad, often about as long as the internodes, pubescent along the margin, especially toward the summit, the lower often puberulent on the surface; ligule nearly 1 mm. long, the white hairs back of it about 2 mm. long; blades flat, ascending to spreading, rather firm, 6 to 20 cm., rarely to 30 cm., long, 6 to 10 mm., rarely to 15 mm., wide, rounded at the base, puberulent on both surfaces, rarely obscurely so, and sparsely pilose as well, or the lower surface nearly or quite glabrous except for a few long hairs mostly along the mid nerve, the margins commonly papillose-ciliate; racemes 2 or 3 (when 3 the terminal frequently reduced), 6 to 14 cm. long, arching,

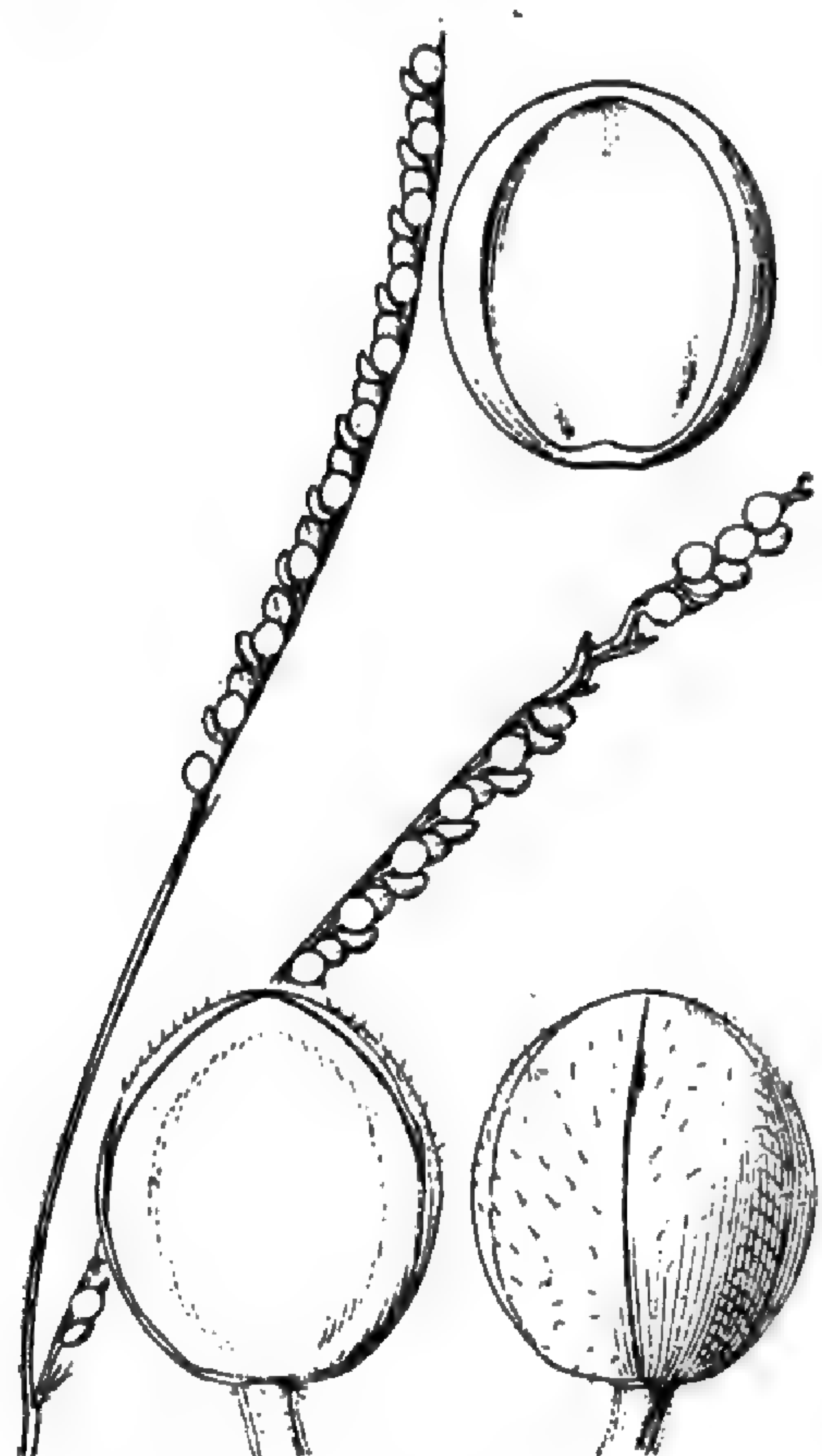


FIGURE 43.—*P. stramineum*. From type collection

the terminal exserted on a slender peduncle, the axillary on short peduncles, often wholly or partly included in the sheaths or one short-exserted, the second included, short racemes commonly borne in basal sheaths; rachis about 1 mm. wide, slightly winged, with a few long hairs at base; spikelets in pairs, crowded or relatively loose on flat pedicels, 2.1 to 2.2 mm. long, nearly 2 mm. wide, sub-orbicular, pale or whitish, the glume 3-nerved, sparsely to rather densely pubescent or sometimes glabrous, the sterile lemma 2-nerved, the mid nerve rarely developed, glabrous; fruit about the size and form of the spikelet, yellowish, smooth and shining.

The spikelets of the axillary racemes are cleistogamous.

DISTRIBUTION

Sandy soil, in open ground or open woods, Indiana to Minnesota, Texas, New Mexico, and northwestern Mexico.

INDIANA: Millers, *Umbach* 4178; *Umbach* (*Kneucker Gram.*) 807. Michigan City, *Deam* 39689. Buffalo, *Deam* 39372.

- ILLINOIS: Oquawka, *Patterson*. Altorf, *Hill* 201 in 1872. Manito, *Wilcox* 56. Beardstown, *Bock & Chase* 206; *McDonald* in 1900. Mt. Carmel, *Waite* in 1887. Anna, *Seymour* in 1880.
- WISCONSIN: Trempealeau, *Fassett* 5164. Qualaska, *Fassett* 5165. La Crosse, *Pammel* 619.
- MINNESOTA: Weaver, *Fassett & Hotchkiss* 2894, 2905. Kellogg, *Fassett & Hotchkiss* 2895.
- IOWA: Iowa City, *Somes* 223, 3606, 3631.
- NEBRASKA: Mullen, *Rydberg* 1582. Halsey, *Hitchcock* 11064. Holt County, *Clements* 2817.
- MISSOURI: Kansas City, *Bush* 6501, 8156, 8165. Sibley, *Bush* 4818. Grandview, *Bush* 1771. Graydon Springs, *Standley* 9936. Allenton, *Letterman* in 1883 and 1894. Campbell, *Bush* 6329. Carruthersville, *Hitchcock* 2437.
- KANSAS: Bow Creek, *Popenoe* in 1875. Manhattan, *Hitchcock* 2381, 2534, 10414; *Kellerman* 8, 30. Riley County, *Norton* 563. Topeka, *Popenoe* in 1878. Lawrence, *Stevens* 21. Wichita, *Smyth* 232.
- TEXAS: Texline, *Griffiths* 5649. Magenta, *Ball* 1655. Littlefield, *Tharp* 4142. Chillicothe, *Ball* 1155. Denison, *Bebb* 1431, 2673. Weatherford, *Tracy* 7937. Handley, *Ruth* 479, 490. Dallas, *Bush* 1163; *Reverchon* 1068, 2832 A. Terrell, *Warburton* 9. Llano, *Plank* 16; *Smith* in 1897. Marsh, *Tharp* 3928. Rockport, *Chase* 6044, 6047, 6064. Brazos County, *Nealley* in 1882. Copano Bay, *Tharp* 1768. Sarita, *Hitchcock* 5488. Ringgold, *Swallen* 980. Without locality, *Hall* 802; *Reverchon* 87.
- OKLAHOMA: Longdale, *Stevens* 814. Alva, *Stevens* 1669. Stillwater, *Hitchcock* 2438. Wichita National Forest, *Rose (For. Serv.)* 42802. False Washita, *Palmer* 368 in 1868.
- COLORADO: Colorado Springs, *Chase* 5293.
- NEW MEXICO: Nara Visa, *Fisher* 34. San Andreas Mountains, *Wooton* in 1914. Roswell, *Griffiths* 5684, 5734. Hagermans, *Wooton* in 1914.
- ARIZONA: Patagonia Mountains, *Peebles & Harrison* 4745.
- SONORA: Between Nogales and Cocospora Ranch, *Griffiths* 6805.
- CHIHUAHUA: Paso del Norte, *Pringle* 1123.

43. *Paspalum pubescens* Muhl.

Paspalum pubescens Muhl. in Willd. Enum. Pl. 89. 1809. "Muhlenberg in litt. * * * Habitat in Carolina." The racemes are described as "subternis," the spikelets glabrous. Three racemes are infrequent in *P. pubescens*, but otherwise the brief description applies well to the specimen so named in the Muhlenberg Herbarium in the Academy of Natural Sciences, Philadelphia. This is like the type of *P. muhlenbergii* Nash. Willdenow cites *P. ciliatifolium* Michx. as a synonym. As shown (p. 86) the type specimen of *P. ciliatifolium* Michx. includes a specimen of *P. pubescens*.

Paspalum muhlenbergii Nash in Britton, Man. 75. 1901. "Mass. to Mo. and Ind. Terr., south to S. Car., Ga., and Miss." The specimen marked "Type" in Nash's script was collected at Vault Hill, near Van Cortlandt Park, N. Y., August 2, 1896, by E. P. Bicknell. In this specimen, now in the herbarium of the New York Botanical Garden, the culms are glabrous below the solitary racemes, the blades are 6 to 7 mm. wide, and the spikelets are glabrous, 2.1 mm. long.

Paspalum pubescens var. *muhlenbergii* House, N. Y. State Mus. Bull. 243-244: 39. 1923. Based on *Paspalum muhlenbergii* Nash.

The species described as *P. ciliatifolium* Michx. by LeConte⁸⁷ is *P. pubescens*, the description possibly drawn from the specimen of *P. pubescens* in the Paris Herbarium included in *P. ciliatifolium*. LeConte cites only "Georgia. Michaux."

⁸⁷ Journ. de Phys. 91: 284 1820.

Trinius⁸⁸ refers "*P. ciliatifolium* Michx. et Ell." to *P. setaceum*. This is catalogued in Index Kewensis as "*P. ciliatifolium* Trin." *P. pubescens* is the species intended.

DESCRIPTION

A slender perennial in dense tufts, rather yellowish-green to olivaceous; culms slender, ascending to spreading, 45 to 90 cm. tall, strongly compressed, glabrous; nodes glabrous; sheaths keeled, pilose toward the summit or at least on the keel and along the margin, sometimes throughout, or the lower, rarely all, glabrous except along the margin; ligule a minute membrane with a dense row of white hairs 3 to 4 mm. long back of it; blades flat, 8 to 20 cm., rarely to 30 cm., long, 2 to 10 mm., rarely to 15 mm., wide, mostly linear, slightly narrowed to a base scarcely wider than the sheath or the upper rounded at base (in the wider-leaved

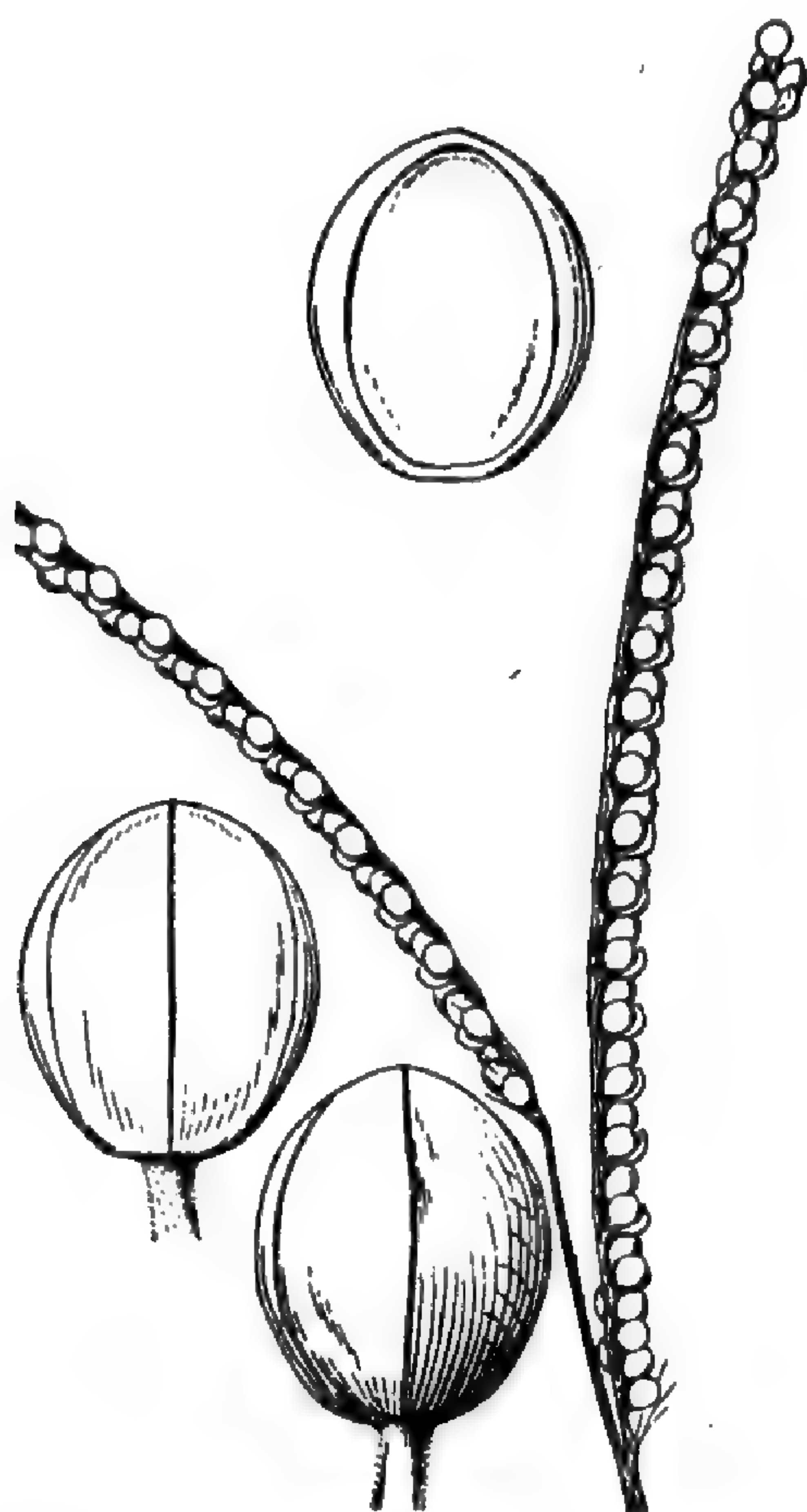


FIGURE 44.—*P. pubescens*. From Hitchcock 298

specimens all more or less rounded), from sparsely to conspicuously pilose on both surfaces, sometimes minutely puberulent beneath the long hairs on the upper surface; peduncles slender, flat, finally elongate, often pilose toward the summit, the axillary 1 or 2 from upper and middle nodes; racemes 1 to 3, more commonly solitary, mostly arching, 4 to 15 cm., rarely to 17 cm., long, the rachis long-pilose at base, the common axis occasionally pilose; spikelets in pairs, crowded on short pedicels, the lower often winged at base, 1.9 to 2.1 mm. long, 1.7 to 1.9 mm. wide, suborbicular to broadly obovate, the glume and sterile lemma subequal, 3-nerved, or the glume rarely 4 or 5 nerved, or the mid nerve of the lemma suppressed, glabrous, the glume rarely sparsely pubescent; fruit about the size and shape of the spikelet.

This species varies in the amount of pubescence. The spikelets are more uniform in shape and size than in most species of this group. Plants with very narrow blades resemble *P. setaceum* but the spikelets are larger. *Paspalum pubescens* is common in pastures and old fields and is reported to be of considerable forage value in Indiana, Tennessee, Alabama, and Florida.

The following specimens have foliage less pubescent than characteristic, approaching the sparsely pubescent plants of *P. ciliatifolium*: Chase 3008, 3011, 4046, 4399, 6052; Curtiss 3576 (a coarse plant with much the habit of *P. supinum*); Deam 42561; Grimes 869; Hitchcock 2439, 2446 (spikelets only 1.8 mm. long); Hubbard 507; Ricker 912; Tracy 7937.

DISTRIBUTION

Dry or moist open ground or open woods, more common in sandy regions, Vermont and Massachusetts to Florida, and west to Michigan, Oklahoma, and Texas.

⁸⁸ Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 340. 1834.

VERMONT: Vernon, *Grout* in 1895.

MASSACHUSETTS: Worcester, *Eaton* in 1878. Dedham, *Mohr & Faxon* in 1895. Berlin, *Hubbard* 507. Sherborn, *Loomis* 1666. Winchester, *Boott* in 1857. Plymouth, *Oakes*. Carver, *Fernald, Hunnewell & Long* 8505. Sandwich, *Fernald & Long* 17891. West Barnstable, *Knowlton* in 1911. West Tisbury, *Seymour* 1041. Nantucket, *Flynn* in 1899.

CONNECTICUT: Salisbury, *Bissell* in 1906. Stratford, *Eames* in 1895. Huntington, *Harger* 5741. East Hartford, *Weatherby* in 1922. South Glastonbury, *Wilson* 5. Windham County, *Round* in 1900. East Lyme, *Graves* 241. Groton, *Graves* 245, 246.

RHODE ISLAND: Westerly, *Weatherby & Collins* in 1919. Block Island, *Fernald, Hunnewell & Long* 8499; *Fernald, Long & Torrey* 8502.

NEW YORK: Lake Waccabuc, *Pollard* in 1894. East Marion, *Latham* 258, 263. Orient, *Latham* 321 and in 1915.

NEW JERSEY: Clifton, *Kearney* in 1894. Atsion, *Chase* 3491.

PENNSYLVANIA: Penryn, *Heller* 764. Conewago, *Heller* in 1901. Smithville Swamp, *Small* in 1889. Easton, *Porter* in 1895. Tullytown, *Pollard* in 1897. Philadelphia, *Scribner* in 1878.

OHIO: Sandusky, *Kellerman* 6807. Perkins, *Mosely* in 1898.

INDIANA: Kewanna, *Deam* 42159. Lake Village, *Deam* 39775 A. Centerville *Deam* 13590. Mansfield, *Deam* 35003. Ferndale, *Deam* 42473. Russellville, *Grimes* 907. Greencastle, *Grimes* 869. Morton, *Deam* 37824. Brazil, *Deam* 42484. Quincy, *Deam* 41829 A. Coal City, *Deam* 35006. Merom, *Deam* 7302. Grayville, *Deam* 18229. Bloomington, *Deam* 26068. Mt. Carmel, *Deam* 41745, 42561. Washington, *Deam* 35068. Cedar Cliffs, *Deam* 17161. Between Paoli and Orleans, *Deam* 26231. Clark County, *Deam* 27992. Princeton, *Deam* 32994. Marengo, *Deam* 33404. St. Croix, *Deam* 41593. Central, *Deam* 41540. Wadesville, *Deam* 42581.

ILLINOIS: Marshall, *Bock & Chase* 18. Lawrenceville, *Bock & Chase* 40. Maude, *Bock & Chase* 51. Mt. Carmel, *Patterson* in 1877. Browns, *Bock & Chase* 54. Albion, *Bock & Chase* 58. Carmi, *Bock & Chase* 59. Harrisburg, *Bock & Chase* 68. Brownsville, *Bock & Chase* 73. Eichorn, *Bock & Chase* 79. Golconda, *Bock & Chase* 100. Metropolis, *Bock & Chase* 104. Grand Chain, *Bock & Chase* 143. Cairo, *Bock & Chase* 151. Unity, *Bock & Chase* 163. Carbon-dale, *Bock & Chase* 177. Ruma, *Bock & Chase* 191. Red Bud, *Bock & Chase* 193. Hardin, *Bock & Chase* 198. Beardstown, *Bock & Chase* 203.

MICHIGAN: Detroit, *Farwell* 1435, 1781.

MISSOURI: Paw Paw Junction, *Bush* 336. Aberdeen, *Bush* 943. Sibley, *Bush* 4823. Atherton, *Bush* 1763. Columbia, *Hitchcock* 2340. St. Louis, *Ball & Brodie* in 1903; *Eggert* in 1875. Allenton, *Kellogg* 39. Jefferson County, *Eggert* in 1896. Webb City, *Palmer* 3066. Springfield, *Hoover* in 1897; *Standley* 8424. Eagle Rock, *Bush* 3128, 3129. Carruthersville, *Hitchcock* 2341.

DELAWARE: Greenbank, *Commons* 87. Stanton, *Commons* 313.

MARYLAND: Great Falls, *Chase* 5872, 7007, 7008. Chevy Chase, *Chase* 2586, 3003. Leonardtown, *Hitchcock* 7858. Berwyn, *Chase* 9948.

DISTRICT OF COLUMBIA: Chevy Chase, *Chase* 9938; *Dewey* 125. Takoma Park, *Chase* 2575. Bennings, *Hitchcock* 2417; *Pollard* in 1897. Washington, *Ball* in 1899; *Pollard* 611; *Steele* in 1896; *Ward* in 1876.

VIRGINIA: Luray, *Chase* 9964. Chain Bridge, *Hitchcock* 2439. Fourmile Run, *Chase* 3008, 3011, 3018; *Dewey* 323. Burkes, *Ball* in 1902. Williamsburg, *Grimes* 3022. Ewell, *Grimes* 4480. Dismal Swamp, *Chase* 3649. Lynn Haven, *Chase* 2941. Cape Henry, *Kearney* 1856. Virginia Beach, *Britton* in 1895; *Williams* 3093.

WEST VIRGINIA: Morgantown, *Berkley* in 1928.

- NORTH CAROLINA: Biltmore, *Hitchcock* 299, 2342. Wilmington, *Hitchcock* 2446.
- SOUTH CAROLINA: Orangeburg, *Hitchcock* 2343. Floyd, *Norton* 358a. Ebenezer, *Bartlett* 2838. Isle of Palms, *Norton* 367b.
- GEORGIA: Stone Mountain, *Hitchcock* 298. Savannah, *Kearney* 198. Waycross, *Ricker* 912. Dock Junction, *Ricker* 969.
- FLORIDA: Pensacola, *Combs* 518. Chipley, *Combs* 629. Lake City, *Combs & Rolfs* 175; *Rolfs* 983. Waldo, *Combs* 699. Gainesville, *Chase* 4236. Hillsborough County, *Fredholm* 6387. Bartow, *Combs* 1176. Without locality, *Curtiss* 3576 in part.
- KENTUCKY: Frankfort, *Terrill* in 1892. Hawesville, *Garman* in 1898.
- TENNESSEE: Knoxville, *Scribner* in 1889 and 1893. Lookout Mountain, *Ruth* 81.
- ALABAMA: Pisgah, *Chase* 4480. Tuskegee, *Carver* 16.
- MISSISSIPPI: Panola County, *Eggert* in 1896. Waynesboro, *Kearney* 162. Nicholson, *Kearney* 350, 355. Biloxi, *Chase* 4345; *Kearney* 219; *Tracy & Ball* 33. Ocean Springs, *Kearney* 297; *Tracy* 113, 147. Scranton, *Tracy* 4632.
- ARKANSAS: Pine Bluff, *Hitchcock* 16118. Benton County, *Plank* 6. Without locality, *Harvey* in 1884.
- LOUISIANA: Calhoun, *Ball* 47. Rayville, *Ball* 12. Coushatta, *Ball* 113. Alexandria, *Ball* 170. Covington, *Arsène* 11260. Lake Charles, *Chase* 4399, 4402, 4417; *Hitchcock* 2444. Oberlin, *Ball* 187.
- TEXAS: Handley, *Ruth* 576. Texarkana, *Heller* 4244. Waller County, *Thurrow* in 1898. Houston, *Thurrow* in 1898. Rockport, *Chase* 6052.
- OKLAHOMA: Wister, *Hitchcock* 2445. Guthrie, *Stevens* 3217. Wichita Mountains, *Swallen* 994. Without locality, *Stevens* 1310.

44. *Paspalum ciliatifolium* Michx.

Paspalum ciliatifolium Michx. Fl. Bor. Amer. 1: 44. 1803. "Hab. in Carolina." The type, bearing the name in Michaux's script, is in the Paris Herbarium, labeled "Hab. in Carolina, Georgia." This consists of three specimens: (1) A single entire culm with linear, sparsely pilose blades, 3 to 4 mm. wide, and one raceme, the spikelets all fallen. This is not identifiable with certainty, but is probably *P. setaceum*. (2) A piece of culm 50 cm. long, with lower sheath and both surfaces of the blades loosely pilose, the upper sheath ciliate only, and two racemes with glabrous spikelets 2 mm. long. This is the less pubescent form of *P. pubescens*, described as *P. muhlenbergii*. (3) A piece of culm 30 cm. long the blades ciliate, otherwise glabrous, the solitary raceme with minutely pubescent spikelets, 2 mm. long and 1.7 mm. wide. A much better specimen agreeing exactly with this bears the name in Richard's script. The description, "foliis latiusculis, pubescentibus, serrulato-ciliatis * * * glumis * * * glabris" covers both the second and third specimens, assuming the pubescence on the spikelets of the third to have been overlooked. The third is taken as the type because it is what has come to be regarded as "true" *P. ciliatifolium*.

Paspalum spathaceum Desv.; Poir. in Lam. Encycl. Suppl. 4: 314. 1816. "Cette plante croît dans l'Amérique (V. s. in herb. Desv.)" The type has not been located. (A specimen of *P. propinquum* named *P. spathaceum* in the Berlin Herbarium, collected by C. Ehrenberg in St. Thomas, can not be the type, since Ehrenberg visited America about 1836.) The description indicates a specimen of *P. ciliatifolium* in which the upper blade had been split, as in Herb. Fla. Agr. College no. 1182.

Paspalum latifolium LeConte, Journ. de Phys. 91: 284. 1820. "Habitat in Carolina australi prope Columbiam." The type, in the herbarium of the Academy of Natural Sciences, Philadelphia, is part of a luxuriant specimen with

blades 17 to 25 cm. long and 2 to 2.5 cm. wide, glabrous on both surfaces and sparingly ciliate on the margin. The spikelets are mostly glabrous, but some are obscurely pubescent on the second glume.

Paspalum ciliatifolium var. *brevifolium* Vasey, Proc. Acad. Phila. 1886: 285. 1886. "In Herb. Scribner * * * collected by Mr. Isaac Burk on the ballast grounds of Philadelphia." This specimen, now in the National Herbarium, is a lax plant with blades 7 to 14 mm. long.

Paspalum setaceum var. *ciliatifolium* Vasey, Contr. U. S. Nat. Herb. 3: 17. 1892. Based on *P. ciliatifolium* Michx.

Paspalum chapmani Nash, Bull. N. Y. Bot. Gard. 1: 290. 1899. "Collected by Dr. A. W. Chapman in Florida." The type, in the herbarium of Columbia University, has pubescent suborbicular spikelets 2.1 mm. long and 1.8 mm. wide.

Paspalum eggertii Nash, Bull. N. Y. Bot. Gard. 1: 434. 1900. "On sandy river banks, Arkansas. Type in the herbarium of Columbia University, collected by Mr. H. Eggert near Pine Bluffs, Jefferson Co., Sept. 4, 1896." In this specimen the lower sheaths are softly pubescent; the blades are mostly wholly glabrous, with a few cilia toward the base; a few are minutely puberulent on the lower surface or on the upper surface at the base. The sparsely pubescent spikelets are 2.1 mm. long.

Paspalum blepharophyllum Nash in Small, Fl. Southeast. U. S. 71, 1326. 1903. "Type, Nash, Pl. Cent. Penins. Fla. no. 1426, in Herb. Nash." This specimen, now in the herbarium of the New York Botanical Garden, agrees perfectly, as subsequently written on the sheet by Nash, with the right-hand plant of the Michaux specimen, referred to above as (3), except that the spikelets of the Michaux plant are a little more pubescent.

Paspalum epile Nash in Small, Fl. Southeast. U. S. 72, 1326. 1903. "Type, Key West, Blodgett, in Herb. C. U." This specimen, in the herbarium of Columbia University, is an overmature robust plant, with rather firm glabrous blades and broad spikelets 2 mm. long, as in the type of *P. ciliatifolium*, but glabrous.

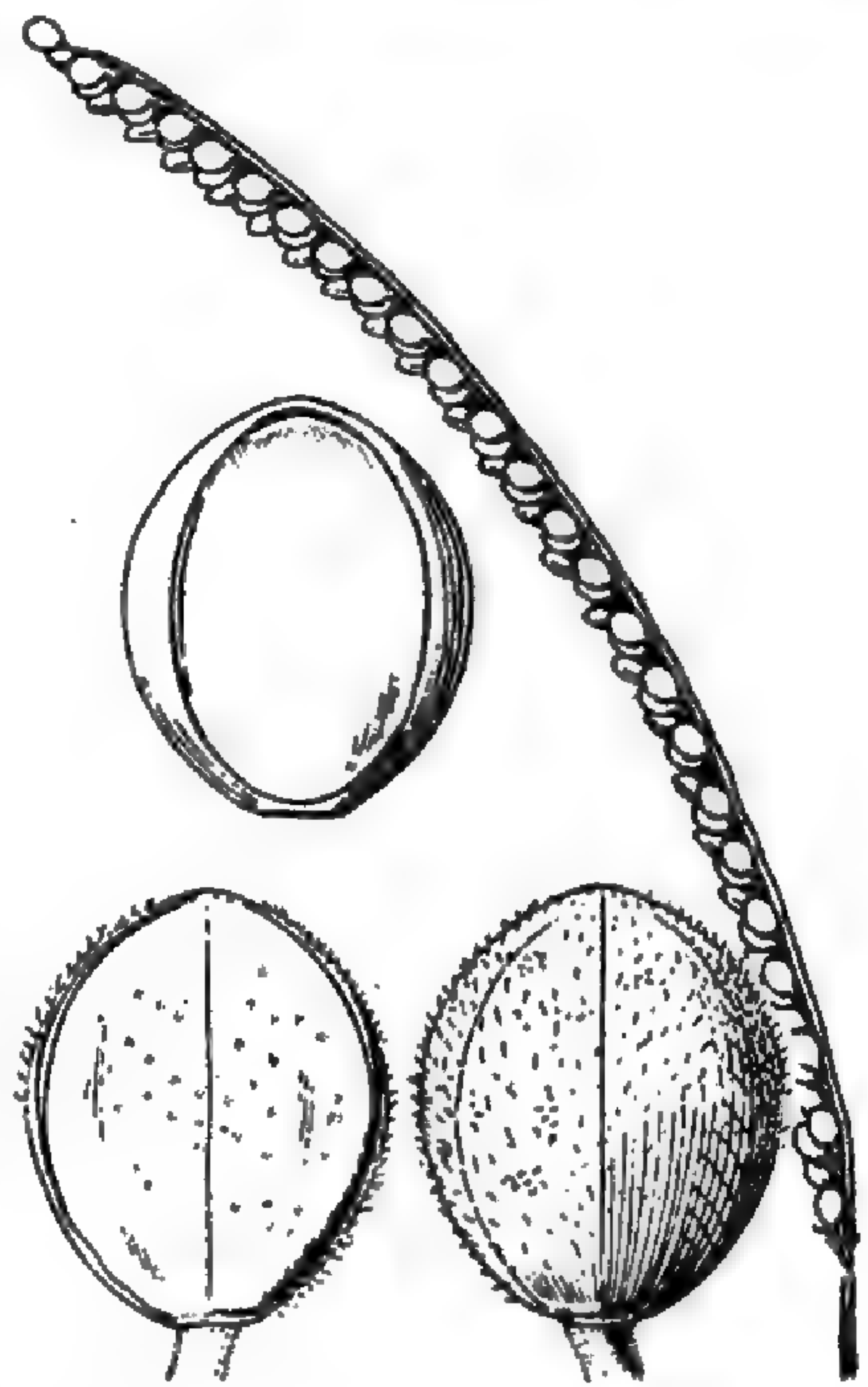


FIGURE 45.—*P. ciliatifolium*. From type specimen and Nash 1426

DESCRIPTION

A slender perennial in rather open tufts, purplish brown toward the base; culms erect to spreading, 35 to 90 cm. tall, glabrous; nodes glabrous; sheaths keeled, rather broad, glabrous or pubescent along the margin, or the lower from puberulent to appressed-pubescent; ligule minute, membranaceous, with a dense row of hairs 2 to 3 mm. long back of it, commonly produced into an erect auricle 0.5 to 1 mm. long on one or both margins; blades flat, from lax to rather firm, ascending to spreading, 10 to 35 cm. long, 7 to 20 mm. wide (rarely as much as 48 cm. long and 25 mm. wide), rounded to subcordate at base or narrowed to the width of the sheath, typically strongly ciliate along a minutely undulate cartilaginous margin, but sometimes ciliate toward the base only, very rarely not at all ciliate, otherwise glabrous or pilose along the mid nerve below or minutely pubescent toward the apex, rarely throughout; racemes 1 to 3, rarely 4, slender, arching, 4 to 15 cm., commonly 7 to 10 cm., long, the slender rachis with a tuft of hairs at base; spikelets in pairs, crowded, 1.9 to 2.1 mm. long, 1.3 to 1.7 mm.

wide, from elliptic-obovate to suborbicular, strongly plano-convex, the glume slightly shorter than the sterile lemma exposing the summit of the fruit at maturity, both 3-nerved, or the midnerve of the lemma suppressed, glabrous, or, especially the glume, minutely pubescent with obscurely capitate hairs, commonly minutely speckled; fruit about the size and shape of the spikelet, pale, smooth and shining.

Paspalum ciliatifolium is a polymorphic species. Study of a great amount of material has made it impossible to recognize as distinct the groups segregated by Nash. Pubescence on foliage and spikelets varies in a single plant. Rather stout, somewhat paler seacoast plants, with firmer blades scarcely ciliate, are the form described as *P. epile*. Plants with softly pubescent lower sheaths, and blades but slightly ciliate, are the form described as *P. eggertii*. The shape of the spikelet varies in a single raceme from elliptic-obovate to suborbicular. The spikelets tend to become rounder at maturity, but both mature and immature are found of both shapes. The spikelet shown in figure 45 was drawn in the Paris Herbarium from the Michaux specimen. In the majority of specimens the spikelets are less rounded than this.

Besides the above variations there are a number of specimens, otherwise typical or fairly typical *P. ciliatifolium*, in which the spikelets are only 1.7 to 1.9 mm. long. These and the specimens of *P. longepedunculatum* with unusually large spikelets approach, but the blades in those referred to *P. ciliatifolium* are larger and not aggregate toward the base.

The most characteristic form is greener than the other species of this group and less leafy at base, the lower blades reduced.

In the following specimens the spikelets are 1.8 to 1.9 mm. long: *Chase* 3988, 3993, 4049, 4054, 4145, 4275, 4367; *Combs* 243, 257, 357; *Eaton* 69; *Hitchcock* 631; *Norton* 367c; *Standley* 18906; *Thomas* 31.

In the following the foliage is sparsely pubescent, approaching the less pubescent specimens of *P. pubescens*: *Chase* 4046; *Hitchcock* 2448; *Norton* 340; *Plank* 61; *Rolfs* 800; *Tracy* 3679, 3688. Some of these also have spikelets 1.8 to 1.9 mm. long.

DISTRIBUTION

Open ground or open woods, mostly sandy, New Jersey to Florida, Tennessee, Arkansas, and Texas; also in Honduras and the West Indies.

NEW JERSEY: Without locality, *Torrey* (?) 24.

MISSOURI: Webb City, *Palmer* 31679.

DISTRICT OF COLUMBIA: Washington, *Chickering* in 1873; *Vasey* in 1882.

VIRGINIA: Natural Bridge, *J. Ball* in 1884. Luray, *Chase* 9963. Arlington, *Ball* in 1903. Fort Monroe, *Vasey* in 1879.

NORTH CAROLINA: Biltmore, *Biltmore Herb.* 4302a. Wilmington, *Hitchcock* 2449; *Kearney* 277.

SOUTH CAROLINA: Aiken, *Ravenel* in 1869 and 1882. Orangeburg, *Hitchcock* 2450, 2451. Isle of Palms, *Chase* 4546, 4547, 4552; *Hitchcock* 2452; *Norton* 367c. Beaufort, *Chase* 7113.

GEORGIA: Stone Mountain, *Chase* 4511; *Eggert* in 1897; *Hitchcock* 206½; *Norton* 340. Albany, *Tracy* 3680. Brunswick, *Chase* 7096.

FLORIDA: Pensacola, *Combs* 519. Milton, *Chase* 4311; *Swallen* 461. De Funiak Springs, *Combs* 459. Chipley, *Combs* 543. Bay Head, *Combs* 639. Marianna, *Swallen* 561. Apalachicola, *Chapman*; *Kearney* 98. Quincy, *Combs* 405. Tallahassee, *Combs* 357, 359; *Kearney* 70; *Nash* 2359a. Monticello, *Combs* 304. Madison, *Combs* 236, 243, 257. Lake City, *Bitting* 831, 1007; *Chase* 4275; *Hitchcock* 2474, 2475; *Rolfs* 800. Jacksonville, *Curtiss* 5079, 6017. Palm Beach, *Hitchcock* 2471, 2477, 2479. Pablo Beach, *Chase* 7030. Duval County,

- Fredholm* 135. St. Augustine, *Chase* 7017. Gainesville, *Chase* 4223, 4237; *Combs* 735, 736; *Norton* 385a. Gulf Hammock, *Garber* in 1876. Cedar Key, *Combs* 770, 800. Dunnellon, *Combs* 917. Homosassa, *Combs* 925. Floral City, *Swallen* 340. Orange Bend, *Chase* 4107, 4111. Eustis, *Chase* 4046, 4049, 4054, 4084; *Hitchcock* 2473, 2476; *Nash* 209, 600, 1001, 1418, 1426. Tavares, *Hitchcock* 816. McDonald, *Baker* 60. Grasmere, *Combs & Baker* 1032. Orange City, *Hood* in 1911. Spruce Creek, *Baker* 248. Titusville, *Chase* 3975, 3976, 3988, 3993, 4003, 4010; *Swallen* 142. Merritt Island, *Swallen* 172. Fellsmere, *Tracy* 9306. Jensen, *Hitchcock* 742. Kissimmee, *Swallen* 249. Lakeland, *Hitchcock* 832. Hillsborough County, *Fredholm* 6383. Braidenton, *Combs* 1285, 1318½, 1329. Manatee, *Rugel* 384. Palma Sola, *Tracy* 6728. Fort Myers, *Chase* 4145½, 4168; *Hitchcock* 507; *Standley* 18906. Punta Rassa, *Hitchcock* 2453; *Standley* 12663. Pine Island, *Tracy* 7201. Sanibel, *Hitchcock* 2454. Marco, *Hitchcock* 2455, 19781. Caxambas, *Hitchcock* 19784. Fort Lauderdale, *Small & Carter* 1227. Little River, *Eaton* 483. Miami, *Chase* 3849, 3853, 3951; *Eaton* 69; *Hitchcock* 628, 631; *Small* 5470; *Small & Carter* in 1903. Cape Florida, *Chase* 3960. Dade County, *Eaton* 1207. Key West, *Curtiss* in 1884.
- TENNESSEE: Ducktown, *Chambliss* 84. White Cliff Springs, *Scribner* in 1890.
- ALABAMA: Washington County, *Mohr* in 1882. Cullman County, *Eggert* in 1897. Selma, *Kearney* 9. Etowah County, *Eggert* in 1897. Mentone, *Mohr* in 1898. Auburn, *Tracy* 3741. Tuskegee, *Carver* 14. Spring Hill, *Bush* 209. Mobile, *Hitchcock* 2456; *Mohr* in 1878.
- MISSISSIPPI: Starkville, *Chase* 4441; *Kearney* 96; *Tracy* in 1892. Biloxi, *Chase* 4367; *Kearney* 338; *Tracy* 1891, 3679, 4501. Ocean Springs, *Kearney* 292; *Tracy* 21. Cat Island, *Tracy* 438a. Point St. Martin, *Tracy* 4503. Deer Island, *Tracy* 2870. Scranton, *Tracy* 4628.
- ARKANSAS: Fulton, *Bush* 969. Without locality, *Harvey*.
- LOUISIANA: Shreveport, *Tracy* 3688. Alexandria, *Ball* 555. Rapides County, *Hale*. Calhoun, *Ball* 47a. Rayville, *Ball* 12a. Burnside, *Combs* 1408. New Orleans, *Drummond* 446. Covington, *Arsène* 11285. Lake Charles, *Chase* 4435, 4436, 6087.
- TEXAS: Dallas, *Reverchon* 2832. Corsicana, *Reverchon* 3468. Palestine, *Plank* 61. Hempstead, *Hall* in 1872. Industry, *Wurzlów* in 1892. Galveston, *Bebb* 1093, 1108; *Hitchcock* 2448. Corpus Christi Bay, *Heller* 1546. Sarita, *Hitchcock* 2457. Austin, *Swallen* 1033.
- HONDURAS: Tela, *Standley* 53039.
- BERMUDA: Hillcrest, *Collins* 155 in part.
- CUBA: Western Cuba, *Wright* 3442. Marianao, *Léon* 779. Baraguá, *Hitchcock* 23342.
- HAITI: Aux-Cayes, *Ekman* H 66.

45. *Paspalum propinquum* Nash

Paspalum propinquum Nash, Bull. N. Y. Bot. Gard. 1: 291. 1899. "Collected by the writer [Nash] in sandy soil at Eustis, Lake County, Florida, on July 25, 1894, no. 1427." The type, in the herbarium of the New York Botanical Garden, is a tall specimen with racemes 9 to 11 cm. long, and pubescent spikelets 1.8 to 1.9 mm. long, most of them somewhat apiculate.

DESCRIPTION

Closely related to *P. ciliatifolium*, the rhizome commonly more developed than usual in that, the blades rather firmer and rarely more than 8 mm. wide; spikelets 1.7 to 1.9 mm. long, elliptic-obovate, slightly pointed, more strongly spotted than usual in *P. ciliatifolium*.

This is a tropical form reaching into peninsular Florida. It differs chiefly in the pointed spikelets, though very few specimens have spikelets as noticeably pointed as in the type. In a few the spikelets are not more pointed than in many of *P. ciliatifolium*. *P. propinquum* is recognized here as a species because the tropical material as a whole is distinguishable from *P. ciliatifolium*. In tropical specimens the blades are often minutely pubescent beneath, or bear a few long hairs on either surface.

DISTRIBUTION

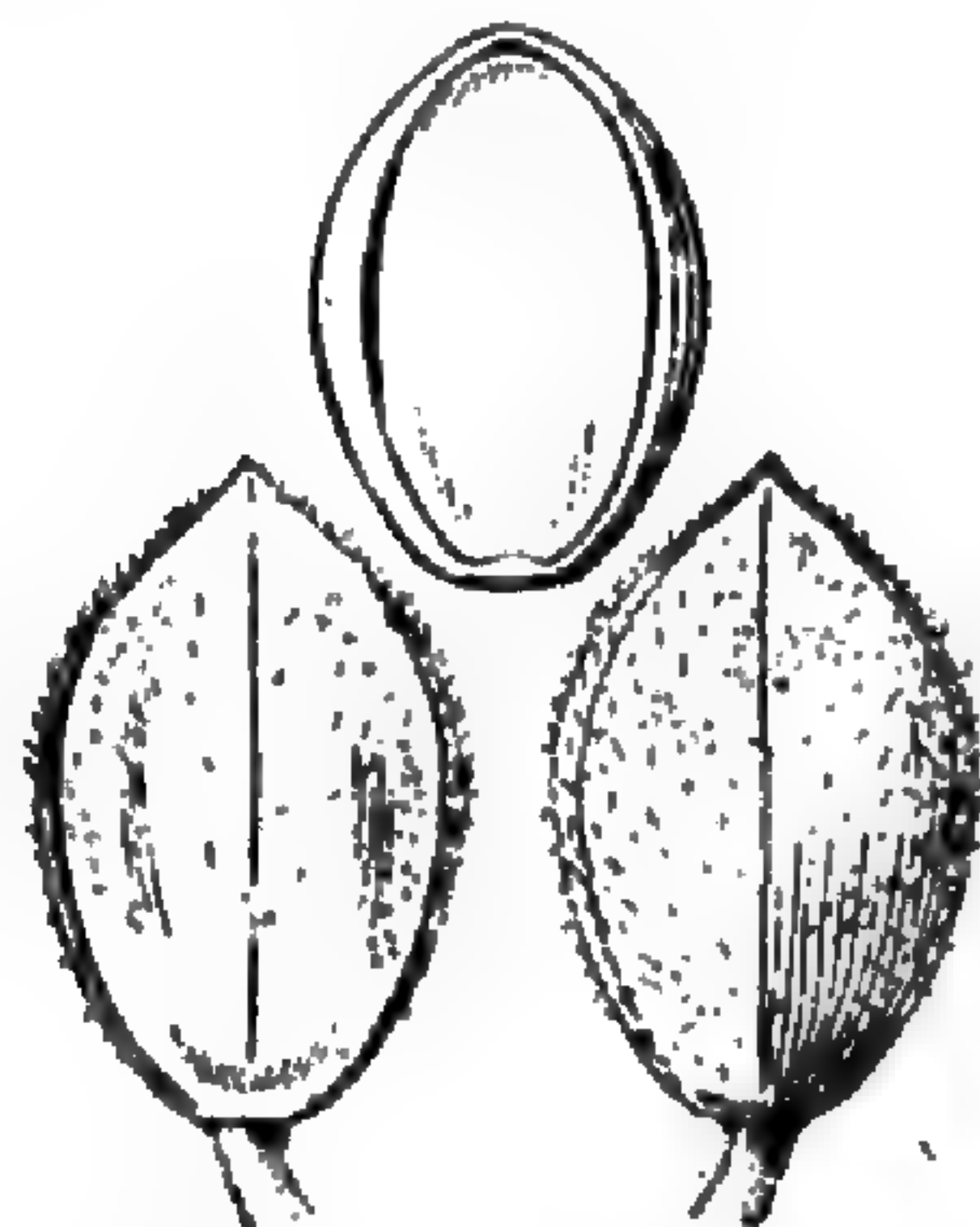


FIGURE 46.—*P. propinquum*. From type specimen

Sandy savannas and sand barrens overlying limestone, peninsular Florida, the West Indies, and Vera Cruz, to Panama.

FLORIDA: Eustis, *Chase* 4075; *Nash* 1427. Arcadia, *Hitchcock* 857. Miami, *Hitchcock* 2458.

VERA CRUZ: Vera Cruz, *Gouin* 27 (Paris Herb.); *Hitchcock* 6549.

MEXICO (Republic of): Zapopán, *Oliva* 80.

HONDURAS: Tela, *Kenyon* 3, 13, 15; *Standley* 53464, 53796, 54231.

EL SALVADOR: San Salvador, *Hitchcock* 8960. Santa Ana, *Hitchcock* 8854.

NICARAGUA: Jinotepe, *Hitchcock* 8684. Corinto, *Hitchcock* 8761.

COSTA RICA: Puntarenas, *Hitchcock* 8587.

PANAMA: Canal Zone, *Hitchcock* 8099, 8165.

BERMUDA: Hillcrest, *Collins* 155 in part. Hamilton, *Brown & Britton* 56.

BAHAMAS: Inagua, *Hitchcock* in 1890.

CUBA: Arroyo Mántua, *Ekman* 10960, 11021. Savanna de Chirigota, *Léon & Roca* 7455. Habana, *Léon* 2738, 3478, 7521. Cojimar, *Léon & Hioram* 5604. Isle of Pines, *Ekman* 11652; *Britton & Wilson* 15665. Without locality, *Wright* 3845.

JAMAICA: Claremont, *Hitchcock* 9520. Appleton, *Hitchcock* 9654. Ipswich, *Hitchcock* 9598.

HAITI: Vallière, *Ekman* H 4501. Bayeux, *Ekman* H 2601.

DOMINICAN REPUBLIC: Haina, *Faris* 11.

PORTO RICO: Mayaguez, *Chase* 6282. Quebradillas, *Chase* 6572. Barcelonita, *Chase* 6439. Campo Alegre, *Chase* 6433, 6613. Vega Baja, *Britton, Britton & Brown* 6950. San Juan, *Chase* 6634½. Playa de Fajardo, *Chase* 6661.

LEEWARD ISLANDS: Antigua, *Wulfschlaegel* 697.

WINDWARD ISLANDS: Barbados, *Hitchcock* 16500.

46. *Paspalum rigidifolium* Nash

Paspalum rigidifolium Nash, Bull. N. Y. Bot. Gard. 1: 292. 1899. "In dry sandy soil, high pine land, peninsular Florida. Type collected by the writer [G. V. Nash] at Eustis, Lake Co., [Florida] May 1-15, 1894, no. 629." This is in the herbarium of the New York Botanical Garden, a duplicate being in the United States National Herbarium.

DESCRIPTION

A slender relatively stiff perennial, often purplish, in tufts from short scaly rhizomes; culms erect to somewhat spreading, 25 to 75 cm. tall, glabrous; sheaths close, the lower usually softly grayish-pubescent, short and overlapping, the upper pubescent along the margin, otherwise glabrous; ligule a minute membrane with a dense row of white hairs 3 to 4 mm. long back of it; blades flat, firm, erect or ascending, linear, 7 to 22 cm., commonly 10 to 15 cm., long, 2 to

5 mm., rarely to 8 mm., wide, usually not wider at base than the summit of the sheath, the scabrous margins usually sparsely ciliate toward the base, otherwise glabrous or minutely puberulent on one or both surfaces; racemes on very slender peduncles, solitary or 2, straight or arching, 7 to 14 cm. long, the rachis with a few long hairs at base; spikelets in pairs on minute nearly glabrous pedicels, crowded, 2 to 2.5 mm., commonly 2.2 to 2.4 mm. long, 1.5 to 1.8 mm. wide, obovate-elliptic, pale or purplish, the glume and sterile lemma subequal, scarcely covering the fruit at maturity, 3-nerved, or the glume sometimes 5-nerved, both glabrous or the glume obscurely pubescent, sometimes minutely speckled; fruit about the size and shape of the spikelet, pale, shining.

This species is distinguished by its stiff habit and large spikelets.

DISTRIBUTION

Sand barrens and high pine land, peninsular Florida to Texas.

FLORIDA: Old Town, *Combs* 844, 896. Crystal, *Combs* 993. Dunnellon, *Combs* 911. Eustis, *Chase* 4071; *Hitchcock* 2489; *Nash* 629. Grasmere, *Combs & Baker* 1029, 1107. Orange City, *Hood* 66. Titusville, *Swallen* 152. Bartow, *Combs* 1223. Winter Haven, *Curtiss* 6666. Tampa, *Combs* 1375. Fort Myers, *Chase* 4184. Miami, *Chase* 3950; *Hitchcock* 643, 684; *Westgate* in 1904. Cutler, *Eaton* 238. Ross Hammock, *Small, Mosier & Small* 6516.

ALABAMA: Chehaw, *Hitchcock* 2447.

MISSISSIPPI: Biloxi, *Chase* 4327, 4354½; *Tracy & Ball* 37.

TEXAS: Waller County, *Thurrow* in 1898.

Decumbentes. (*Harpostachys* Trin.⁸⁹ as section, *Dimorphostachys* Fourn. as a genus).—Perennial, mostly branching, and with axillary inflorescences; racemes 1 to several (as many as 15 in *P. botterii*); rachis mostly about 1 mm. wide; spikelets in pairs on short pedicels; first glume commonly developed in at least one of the pair (usually obsolete in *P. nutans* and *P. culiacanum*), that of the primary spikelet (the upper one of a pair) in most species minute or obsolete, that of the secondary spikelet (the lower of a pair) well-developed, long-pointed and turned to one side of the spikelet; fruit papillose-striate. The development of the first glume is exceedingly variable in all the species except *P. decumbens*. The extremes of size are commonly found in single racemes. The large glume on the secondary spikelet is inconspicuous in most species, because in this spikelet, being seen from the side, the midnerve of the glume coincides with the marginal nerve of the sterile lemma. In several of the original descriptions this glume has been overlooked.

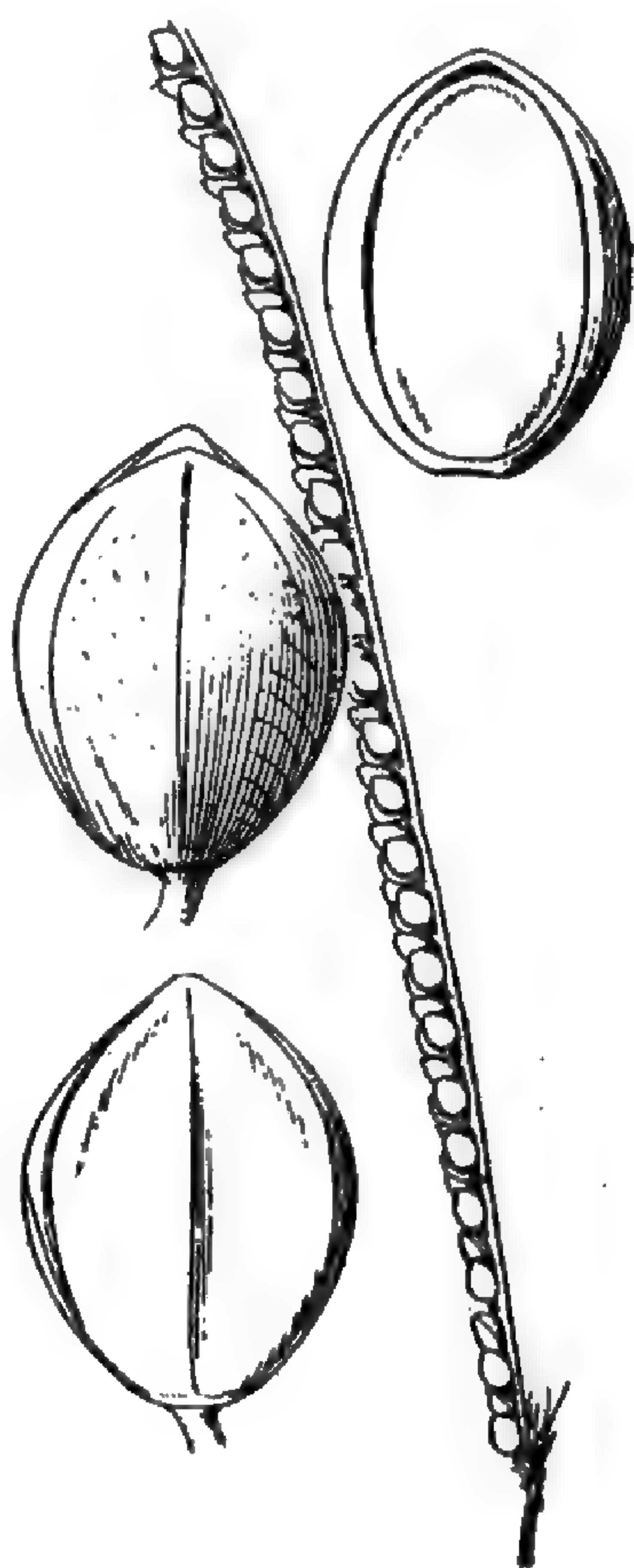


FIGURE 47.—*P. rigidifolium*.
From type specimen

Plants with stout scaly rhizomes, the culms mostly solitary. Spikelets glabrous, first glume often obsolete.

Blades flat, 8 to 15 mm. wide.....52. *P. unispicatum*.

Blades folded at base, the margins adnate above, not more than 2 mm. wide.....53. *P. monostachyum*.

⁸⁹ Mém. Acad. St. Pétersb. VI. Sci. Nat. 3^e: 227. 1834.

Plants without rhizomes, culms more or less tufted.

Spikelets not more than 2 mm. long.

Plants decumbent, creeping.

First glumes small, about equally developed on all spikelets.

47. *P. decumbens*.

First glumes obsolete or only occasionally developed.....48. *P. nutans*.

Plants erect or ascending, not creeping. First glume of secondary spikelet elongate.....49. *P. dispar*.

Spikelets more than 2 mm. long. Plants not decumbent.

Spikelets glabrous (sometimes obscurely pubescent in *P. adoperiens*).

Nodes, at least the lower, pubescent; sterile lemma subindurate, minutely papillose; first glume commonly well-developed. Spikelets glabrous.

Racemes 2 or 3.....50. *P. peckii*.

Racemes solitary.....51. *P. pilosum*.

Nodes glabrous; sterile lemma not subindurate nor papillose; first glume commonly rudimentary or obsolete or occasionally developed. Racemes few to several, rarely solitary.

Blades harshly pilose to glabrescent; spikelets broadly obovate, elliptic to suborbicular.....54. *P. adoperiens*.

Blades glabrous except for a few hairs at the very base; spikelets obovate-elliptic, not suborbicular.....55. *P. culiacanum*.

Spikelets pubescent, at least on the second glume.

First glume developed in both spikelets, rarely wanting in the primary spikelet. Spikelets glandular-speckled.

Spikelets sparsely pubescent, 2.2 to 2.6 mm. (rarely to 2.8 mm.) long; first glume of secondary spikelet small.....56. *P. langei*.

Spikelets densely pubescent, at least on the second glume, 2.9 to 3.2 mm. long; first glume of secondary spikelets $\frac{1}{5}$ to $\frac{2}{3}$ as long as the spikelet.

57. *P. variabile*.

First glume obsolete or nearly so on the primary spikelet, often or commonly obsolete on the secondary.

Racemes 1 to 3; blades less than 1 cm. wide.....58. *P. palmeri*.

Racemes 4 to 15; blades 1 to 2.4 cm. wide.....59. *P. botterii*.

47. *Paspalum decumbens* Swartz

Paspalum decumbens Swartz, Prodr. Veg. Ind. Occ. 22. 1788. "Jamaica." Specimens of Swartz's collection so named from Jamaica were examined in the Delessert Herbarium and in the Munich and Berlin herbaria. The specimens are immature with but 1 or 2 peduncles. *Paspalum decumbens* Rottb. Act. Lit. Univ. Hafn. 1: 285, 1778, is not valid publication, but merely the mention of a decumbent species of *Paspalum* eaten by sheep in Dutch Guiana.

Paspalum pedunculatum Poir. in Lam. Encycl. Suppl. 4: 315. 1816. "Cette plante croît à Cayenne. (V. s. in herb. Desfont.)" The type, bearing the name in Poiret's script, was examined in the Florence Herbarium.

Panicum decumbens Roem. & Schult. Syst. Veg. 2: 429. 1817. Based on *Paspalum decumbens* Swartz.

Paspalum vaginiflorum Steud. Syn. Pl. Glum. 1: 19. 1854. "Ex Hrbo. Paris et Lenormand. Guiana." The type, bearing the name in Steudel's script, was examined in the Paris Herbarium. It is a mature plant with several axillary peduncles. The specimen in the Lenormand Herbarium at Caen agrees with this.

Dimorphostachys pedunculata Fourn. Mex. Pl. 2: 15. 1886. Based on *Paspalum redunculatum* Poir.

DESCRIPTION

A low perennial, freely branching, the culms spreading or creeping with ascending ends, rooting at the lower nodes, often forming mats; culms 10 to 70 cm. long, the internodes short, compressed, glabrous or pubescent below the nodes; nodes pubescent or glabrescent; sheaths keeled, sparsely to rather densely papillose-pubescent, or nearly glabrous except for the finely ciliate margin; ligule membranaceous, about 0.5 mm. long; blades flat, spreading, 2 to 15 cm., commonly 5 to 10 cm., long, 6 to 12 mm. wide, rounded at base, contracted at the junction with the sheath, from velvety to sparsely pubescent on both surfaces, commonly more densely pubescent beneath, finely ciliate on the margin, the pale midnerve prominent beneath; peduncles 2 to 8 from the uppermost sheath, or in luxuriant plants from several upper sheaths (solitary in young plants), very slender, usually pubescent toward the summit; racemes solitary (very rarely 2), 1 to 3.5 cm. long, arcuate, the rachis commonly sparsely pubescent on the back toward the base; spikelets in pairs on minute puberulent pedicels, crowded, 1.7 mm. long, about 1.3 mm. wide, obovate, strongly plano-convex, glabrous, the first glume developed, small and nerveless on the primary spikelet, often larger and pointed on the secondary; second glume about half as long as the spikelet, 3-nerved, the sterile lemma equaling the fruit, 3-nerved, the lateral nerves strong, forming a narrow rim about the spikelet; fruit about the size and form of the spikelet, pale, minutely papillose-striate.

DISTRIBUTION

Open or partly shaded slopes mostly on clay soil, up to 1600 meters, often a weed in waste ground, Guatemala and the West Indies to Brazil and Bolivia.

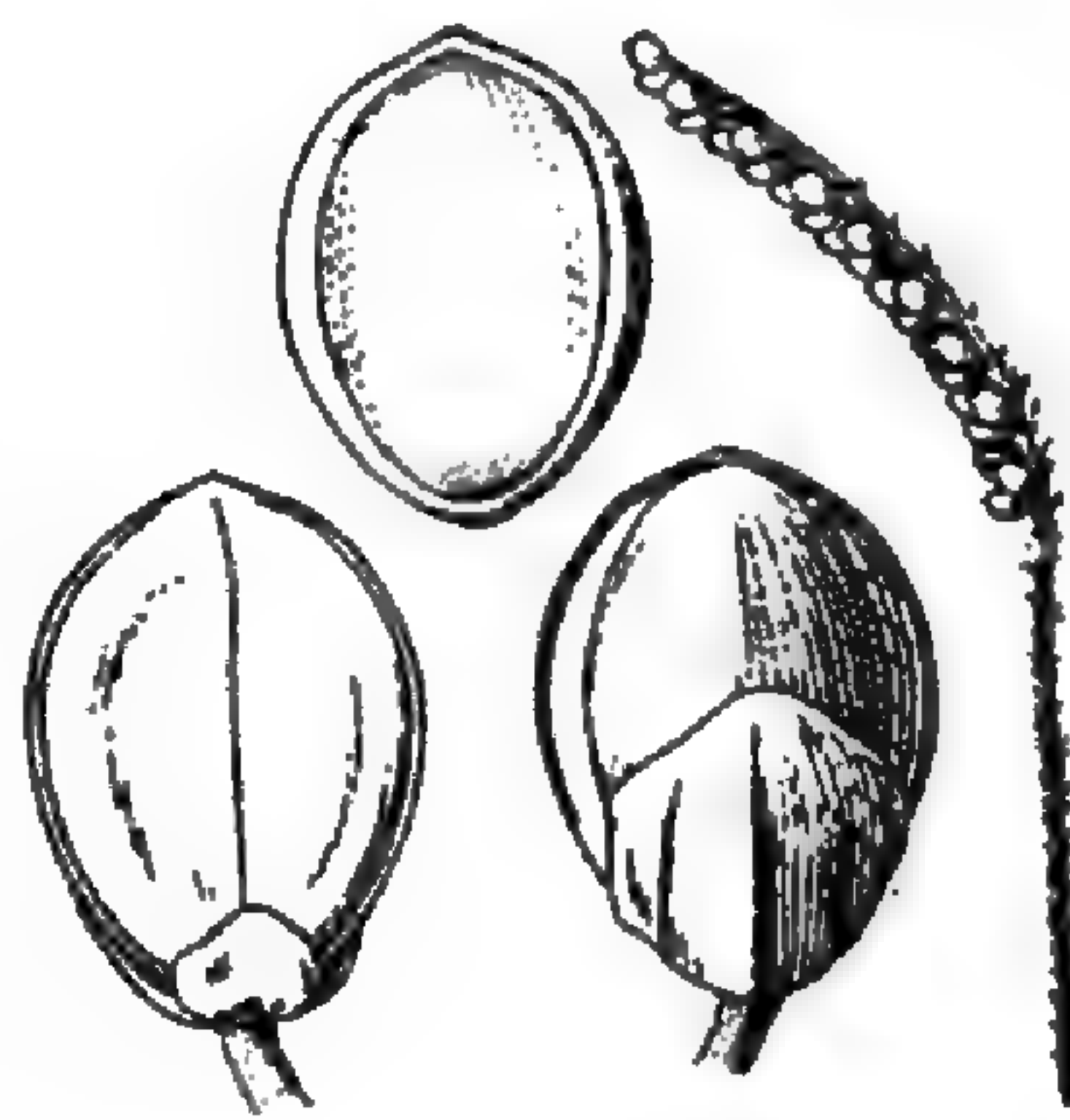


FIGURE 48.—*P. decumbens*.
From Hitchcock 9562

GUATEMALA: Cubilquitz, *Türckheim* II. 951, II. 1452;

Türckheim (*Dist. Smith*) 7794, 8798. Secanquím, *Pittier* 207. Quebradas, *Pittier* 8581. Quiriguá, *Standley* 23862, 23905, 24187. Izabal, *Blake* 7812, 7834. Puerto Barrios, *Hitchcock* 9157; *Standley* 24726.

COSTA RICA: Pejivalle, *Standley & Valerio* 46755. Hacienda de Guacimo, *Tonduz* 15. Las Vueltas, *Tonduz* 12992. Port Limon, *Hitchcock* 8431. Buenos Aires, *Tonduz* 3649, 3686. General, *Pittier* 3375 in part. Cocos Island, *Pittier* 16269. Without locality, *Pittier* 3655; *Tonduz* 4880.

PANAMA: David, *Hitchcock* 8361. San Felix, *Pittier* 5185, 5752. Laguna de Chiriquí, *Hart* 180. Chorrera, *Hitchcock* 8141. Canal Zone, *Hitchcock* 7939, 7960, 7962, 7990, 8115; *Kenoyer* 128; *Standley* 29299, 30274, 31662. Taboga Island, *Hitchcock* 8088.

CUBA: Pinar del Río, *Wright* 3851. San Diego de los Baños, *Léon* 4569. Sierra de los Órganos, *Ekman* 12966. Isle of Pines, *Curtiss* 327.

JAMAICA: Bull Head Mountain, *Amer. Gr. Nat. Herb.* 573. Upper Clarendon, *Harris* 12255. Ram's Horn Range, *Hitchcock* 9562. Hardware Gap, *Harris* 11545. Castleton, *Harris* 11606. Seamens Valley, *Maxon & Killip* 58. Claverty Cottage, *Harris* 11522. Mattis River, *Maxon & Killip* 190; *Perkins* 1485.

HAITI: Port-de-Paix, *Ekman* H 3693. Plaisance, *Leonard* 9336. Pérodin, *Ekman* H 3483. Kalacroix, *Leonard* 7840, 7855.

PORTO RICO: Mayaguez, *Chase* 6170, 6176, 6186; *Holm* 88. Rosario, *Chase* 6264. Monte Alegrillo, *Chase* 6235. Monte Montoso, *Britton & Cowell* 4118. Yauco, *Britton & Britton* 7225. Adjuntas, *Britton & Shafer* 2135; *Chase* 6473; *Heller* 6354. San Juan, *Chase* 6399, 6648. Trujillo Alto, *Chase* 6361. Las Cruces,

- Britton & Britton* 9068. Cayey, *Chase* 6340. Rio Grande, *Chase* 6718. Mameyes, *Cowgill* 627. Fajardo, *Britton & Shafer* 1680.
- TRINIDAD: St. Ann, *Britton & Hazen* 1688. Port of Spain, *Hitchcock* 9957½. St. Joseph, *Hitchcock* 10175. Arima, *Hitchcock* 10308. Piarco Savanna, *Hitchcock* 10353. O'Meara Savanna, *Britton & Hazen* 1582. Masacas, *Broadway* in 1925. Cedros, *Hitchcock* 10135. Without locality, *Finlay* 39; *Bot. Gard. Herb.* 2271.
- COLOMBIA: Santa Marta, *Smith* 2157, 2259. La Cumbre, *Killip* 6002. Between Santa Rosa and Cisneros, *Killip* 5342. Córdoba, *Pittier* 535, 538.
- VENEZUELA: Tovar, *Fendler* 2535. Lora River, *Pittier* 10928. Los Teques, *Pittier* 6101.
- BRITISH GUIANA: Wanama River, *Gleason* 3868. Bartica, *Hitchcock* 17195. Wismar, *Hitchcock* 17278. Akyma, *Hitchcock* 17421. Mackenzie, *Hitchcock* 17465. Mazaruni River, *Ward* 159. Upper Demerara River, *Jenman* 4073. Potaro River, *Abraham* 346.
- FRENCH GUIANA: Cayenne, *Broadway* 426, 468. Without locality, *Leprieur* 81.
- BRAZIL: Pará, *Goeldi* 29. Bahia, *Riedel* in 1831. Viçosa, *Bailey* 1181, 1218; *Chase* 9510. Lagoa Santa, *Chase* 8999. Pico da Tijuca, *Chase* 8483½. Monte Serrat, *Chase* 8351.
- ECUADOR: Teresita, *Hitchcock* 20413. Between La Chorita and Portovelo, *Hitchcock* 21210.
- PERU: Colonia Perené, *Hitchcock* 22061, 22066.
- BOLIVIA: Mapiri, *Rusby* 211. San Carlos, *Buchtien* 47, 48 in 1926. Hacienda Simaco, *Buchtien* 5314. Hacienda Casana, *Buchtien* 7105, 7106. Coroico, *Buchtien* 6445; *Hitchcock* 22718.

48. *Paspalum nutans* Lam.

Paspalum nutans Lam. Tabl. Encycl. 1: 175. 1791. "Ex America merid. Communic. D. Richard." The type, bearing the name in Lamarck's script "ex D. Richard," in the Paris Herbarium, is a single culm without the base and a single terminal raceme, no axillary ones showing. The blades are puberulent.

Paspalus curvistachyus Raddi, Agrost. Bras. 26. 1823. "In sylvestribus non procul ab urbe Rio janeiro." There are two sheets of this, one with a ticket with the name in Raddi's script and two plants, the other with three plants. Both sheets contain two species. One, the left-hand plant on the first sheet and the left and middle plants on the second sheet, is the same as *Paspalum nutans* Lam. The description was evidently drawn up from both species, but two characters given, "glumis calycinis corolla brevioribus" (glume and sterile lemma shorter than the fruit), and "nodes rooting" apply to the specimens of *P. nutans* and not to the right-hand plant on each sheet. The left-hand plant of the second sheet, being the best specimen, is selected as the type. This specimen has four racemes in the terminal inflorescence and one on each of two branches. It is well matched by Hitchcock's no. 10301 from Trinidad, with three racemes in the terminal inflorescence. The right-hand specimens on each sheet are over-mature single plants of *Paspalum arenarium* Schrad. *P. curvistachyus* was erroneously given as "*Paspalum eriostachyum* Raddi" by Dietrich.⁹⁰

Paspalum protensum Trin. Gram. Pan. 108. 1826. "(Sieber hb. Maur. II. no. 29.)" Three specimens of this collection are in the Delessert Herbarium. All have axillary racemes.

Paspalus singularis Link, Hort. Berol. 1: 48. 1827. "Hab. in Brasilia." In the type specimen, bearing the name in Link's script, in the Berlin Herbarium,

⁹⁰Syn. Pl. 1: 254. 1839.

there is a single raceme on each of two plants with an axillary raceme in the upper sheath of one. The blades are pubescent.

Paspalum heteropodium Steud. Syn. Pl. 1: 19. 1854. "*P. supinum* Sieber Hrb. Maurt. nr. 29. Ins. Maurit." This specimen, with 4 racemes in the terminal inflorescence, and bearing the name in Steudel's script, was examined in the Steudel Herbarium in the Paris Herbarium. It is the same collection as the type of *P. protensum* Trin.

Paspalum supinum Sieb.; Steud. Syn. Pl. Glum. 1: 19, 1854, as synonym of *P. heteropodium* Steud. Not *P. supinum* Bosc. 1804.

Paspalum boivini Steud. Syn. Pl. Glum. 1: 416. 1854. "Boivin legit in Ins. Mauriti." In this specimen, bearing the name in Steudel's script, in the Paris Herbarium, there is a single raceme from the upper sheath, the terminal inflorescence probably fallen.

Paspalum lloydii Nash, N. Amer. Fl. 17: 178. 1912. "Type collected at Montpelier, Dominica, 1903, Francis E. Lloyd 590 (herb. N. Y. Bot. Gard.)." The type is a single plant with two branching culms, one with a single raceme, the other with two.

DESCRIPTION

A low perennial, branching, radiate-spreading or creeping with ascending ends or, in shade, suberect from a decumbent base; culms 25 to 90 cm. long, compressed, glabrous; nodes glabrous or sparsely pubescent, occasionally densely bearded; sheaths keeled, softly pilose along the margin and often across the collar, otherwise glabrous; ligule about 1.5 mm. long; blades flat, spreading, 4 to 16 cm. long, 5 to 15 mm. wide, commonly unsymmetrically narrowed to a rounded base, or the lower tapering to a narrow base, mostly rather finely papillose-pubescent on both surfaces, sometimes glabrous or nearly so; peduncles 1 to 4 from the terminal sheaths only, very slender, finally elongate, glabrous or minutely pubescent, the primary peduncle often with 2 to 4 racemes, the others with a single one only; racemes 2 to 6 cm. long, usually arcuate at maturity, the rachis glabrous or with a few long hairs at base; spikelets in pairs, crowded, 1.8 to 2 mm. long, 1.2 to 1.3 mm. wide, obovate-elliptic, strongly plano-convex, nearly glabrous, the first glume obsolete or occasionally developed especially on the secondary spikelet, the second glume about three-fourths as long as the spikelet, 5-nerved, usually obscurely ciliate on the margin at least toward the base, the sterile lemma equaling the fruit, 5-nerved, the lateral nerves approximate; fruit about the size and shape of the spikelet, pale, papillose-striate.

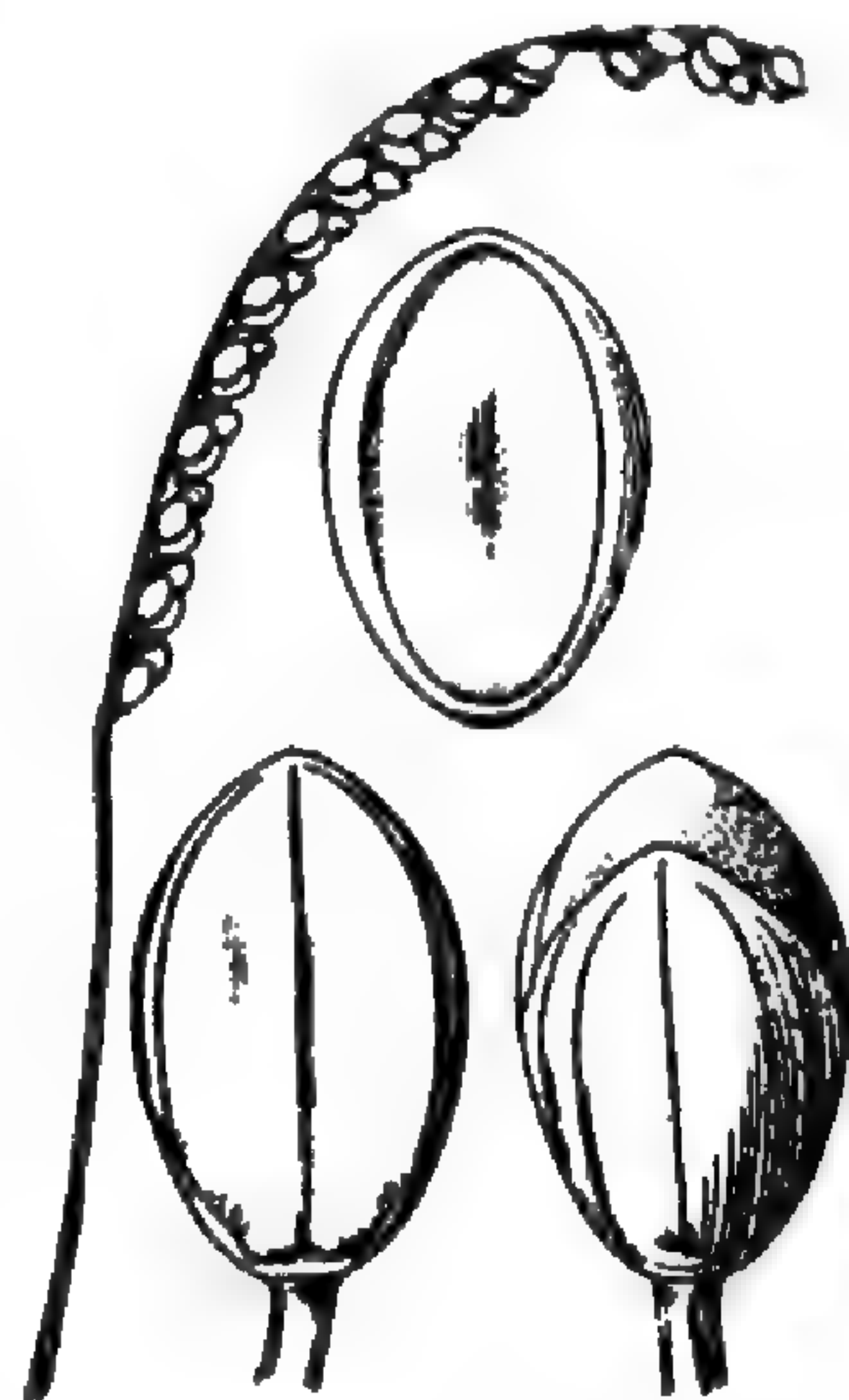


FIGURE 49.—*P. nutans*.
From type specimen of *P. curvistachyum*

DISTRIBUTION

Partly shaded slopes and banks and mossy cliffs, to 1,000 meters altitude, Honduras, and the Leeward Islands to Brazil; also in the island of Mauritius.

HONDURAS: Siguatepeque, *Standley* 56028.

EL SALVADOR: Volcano San Salvador, *Hitchcock* 8936.

COSTA RICA: Pejivalle, *Standley & Torres* 47709. San José, *Hitchcock* 8472.

General, *Pittier* 3375 in part.

PANAMA: San Felix, *Pittier* 5753. El Boquete, *Hitchcock* 8230. Chepo, *Pittier* 4719. Canal Zone, *Hitchcock* 8047; *Killip* 4125; *Pittier* 2381; *Standley* 25445, 26049.

LEEWARD ISLANDS: St. Christopher, *Hitchcock* 16351. Guadeloupe, *Duss* 4059. Dominica, *Bryant* 5.

WINDWARD ISLANDS: "Martinique et Guadeloupe," *Husnot* 77. Grenada, *Broadway* 1729.

TRINIDAD: St. Ann, *Broadway* 4914, 5331. Port of Spain, *Chase* 9930; *Hitchcock* 9957, 9982, 10040, 10200. St. Joseph, *Hitchcock* 10015. Mt. Tucuche, *Britton, Hazen & Mendelson* 1249. Arima, *Hitchcock* 10299, 10301. Belmont, *Broadway* 2811.

COLOMBIA: Santa Marta, *Smith* 2156.

VENEZUELA: Cristóbal Colón, *Broadway* 261. Sacupana, *Rusby & Squires* 348.

BRITISH GUIANA: Penal Settlement, *Hitchcock* 17034, 17083.

FRENCH GUIANA: Cayenne, *Broadway* 876. Without locality, *Leprieur* 91.

BRAZIL: Pará, *Goeldi* 40. Pernambuco, *Chase* 7731. Caparaó, *Chase* 9636.

Serra da Gramma, *Chase* 9614. Viçosa, *Chase* 9448, 9512. Serra do Cipó, *Chase* 9120, 9199. Juiz de Fóra, *Chase* 8562, 8567. Pico da Tijuca, *Chase* 8479, 8483.

Corcovado, *Chase* 7638, 8189, 8199. Monte Serrat, *Chase* 8259.

Serra de Itatiaia, *Chase* 8341. Ribeira, *Brade* 6179.

AFRICA: Mauritius, *Boivin* 1498; *Sieber* II. 29.

49. *Paspalum dispar* Chase, sp. nov.

DESCRIPTION

A slender perennial, in tufts of few to several very unequal erect or ascending culms, 12 to 35 cm. tall, simple except for axillary peduncles, sparsely pilose

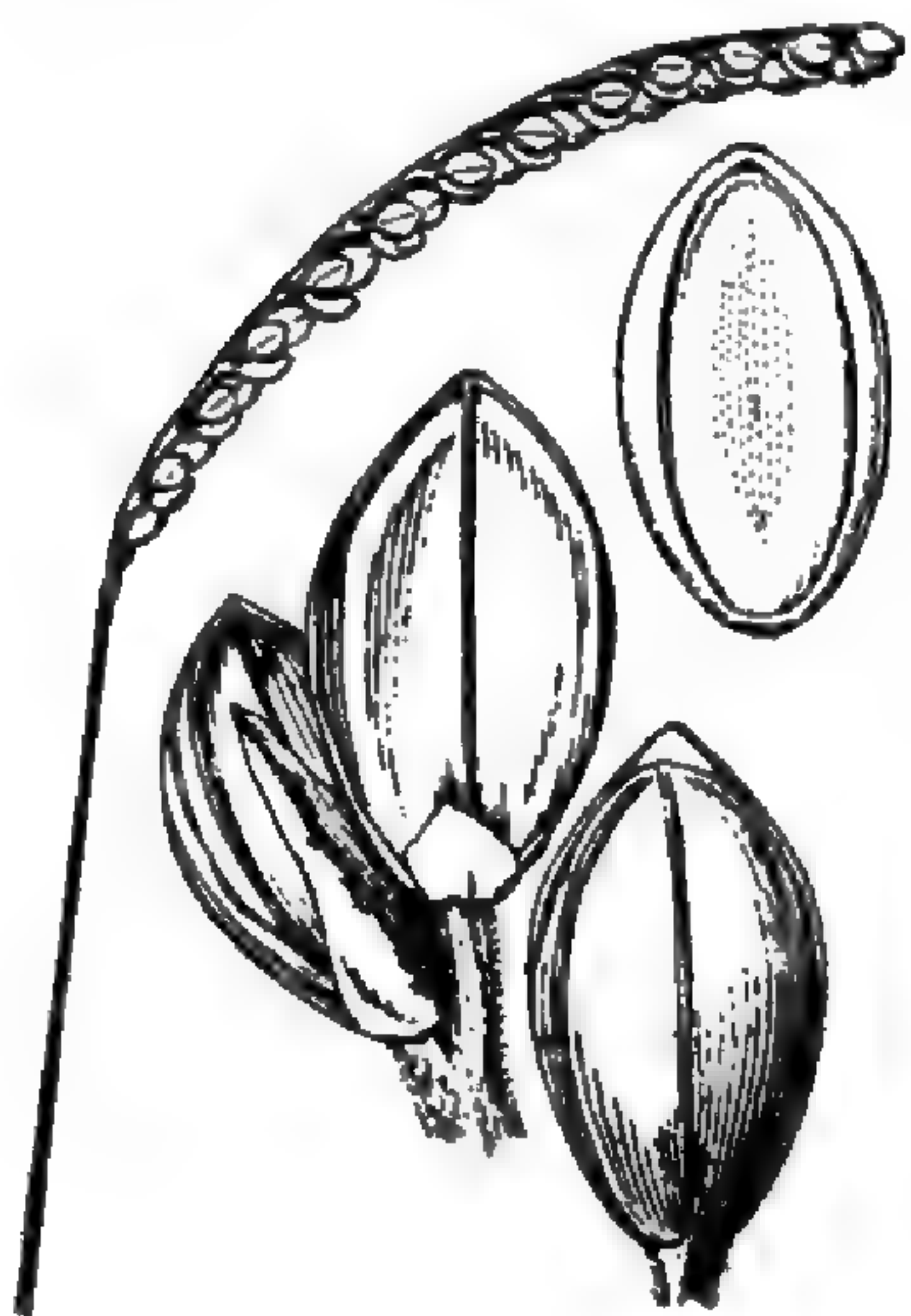


FIGURE 50.—*P. dispar*. From type specimen

below the raceme, otherwise glabrous; nodes spreading-pilose; sheaths keeled, finely papillose-pilose at least along the margin, the lower short, overlapping, ligule membranaceous, about 1.5 mm. long; blades flat, ascending, 4 to 15 cm. long, 3 to 5 mm. wide, the base about as wide as the summit of the sheath, the junction obscure, finely pubescent on both surfaces, more sparsely so above, finely ciliate on the margin, the pale mid nerve prominent beneath; peduncles 2 or 3 from the upper sheath, the axillary ones concealed until the primary one approaches maturity, filiform, sparsely pilose; racemes solitary, 1.5 to 4.5 cm. long, arcuate, the rachis obscurely pubescent at base; spikelets in pairs on minute puberulent pedicels, rather crowded, 1.9 mm. long, about 1.2 mm. wide, elliptic-obovate, strongly plano-convex, glabrous, the first glume small and nerveless on the primary spikelet, 1-nerved, pointed, and mostly from two-thirds to three-fourths as long as the spikelet on the secondary; second glume and sterile lemma 3-nerved, the glume a little shorter than the fruit, the palea of the sterile lemma usually developed, from rudimentary to nearly as long as the lemma; fruit nearly the size of the spikelet, pale, minutely papillose-striate.

Type in the U. S National Herbarium no. 1299915, collected on hillside among shrubs north of Restauración, Province of Monte-Cristi, in the Cordillera Central, Dominican Republic, altitude 700 meters, June 4, 1926, by Dr. E. L. Ekman (no. H 6248). Known only from the type collection.

50. *Paspalum peckii* Hubbard

Paspalum peckii Hubbard, Proc. Amer. Acad. 49: 495. 1913. "Type (in the Gray Herb.) and only specimen seen, pine ridge near Manatee Lagoon [British Honduras], July 18, 1905, M. E. Peck, no. 71." This specimen is a complete plant with overmature inflorescence.

DESCRIPTION

A densely tufted leafy perennial; culms erect, 72 to 82 cm. tall, glabrous; nodes sparsely short-pubescent; sheaths overlapping, the lower strongly keeled, pilose along the margin and on the collar, otherwise glabrous; ligule membranaceous, 2 to 3 mm. long; blades erect, folded at base, flat or loosely folded above, 14 to 30 cm. long, 5 to 8 mm. wide (the uppermost reduced), sublinear, long-acuminate, rather firm, sparsely puberulent on both surfaces and with long hairs back of the ligule, the mid nerve prominent beneath; peduncles slender, elongate, glabrous or sparsely pubescent, 1 or 2 from the upper sheath; racemes 2 or 3, 1.2 to 3.5 cm. distant, 6 to 13 cm. long, slightly falcate, the rachis channeled, narrowly winged, scarcely 2 mm. wide, pubescent in the axils, the margin scabrous and with a few scattered long hairs; spikelets in pairs, scarcely crowded, 2.7 mm. long, 1.2 mm. wide, elliptic-obovate, rather turgid, glabrous, the unequal pedicels pubescent; first glume obsolete or rudimentary on the primary spikelet, from rudimentary to half the length of the spikelet, pointed and eccentric on the secondary; second glume and sterile lemma 5-nerved, the glume shorter than the fruit, the lemma concave down the middle, the mid nerve depressed, inclosing a palea of equal length, thin in the middle and firm on the two keels, and sometimes a staminate flower; fruit 2.2 mm. long, finely papillose-striate.

This species has the habit of *P. pilosum*, but the foliage is only obscurely pubescent. It differs chiefly in having 2 or 3 racemes, with slightly wider rachis, and in the texture of the sterile lemma, not subindurate and papillose as in *P. pilosum*.

Known only from the type specimen.



FIGURE 51.—*P. peckii*. From type specimen

51. *Paspalum pilosum* Lam.

Paspalum pilosum Lam. Tabl. Encycl. 1: 175. 1791. "Ex America calidiore. Comm. D. Richard." The type, bearing the name in Lamarck's script, in the Paris Herbarium, consists of part of a culm with two leaves and a terminal raceme and a single axillary one from the upper sheath.

Panicum monostachyum H. B. K. Nov. Gen. & Sp. 1: 96. 1816. "Crescit in sylvis Orinocensibus, juxta Fernando de Atabapo, rupem Aricagua et Raudal de Atures," on the boundary between Venezuela and Colombia. In the Paris Herbarium is a specimen with the name and "In sylvis orinocensibus prope Fernando de Atabapo" in Bonpland's script, and apparently a duplicate in the Berlin Herbarium from Kunth's herbarium, "Orinoco, ex herb. Humb." Both are complete specimens. In both the first glume on the secondary spikelet is large and eccentric, though it is not mentioned in the original nor in the later

fuller, description⁹¹. In the plate only the primary spikelet with the minute glume is shown. The Paris specimen is taken as the type.

Paspalum monostachyum Willd.; Steud. Nom. Bot. ed. 2, 2: 260, 272, 1841, as synonym of *Panicum monobotrys* Trin., a nomen nudum. The name is not based on *Panicum monostachyum* H. B. K., that name being listed as a different species, with *P. cultratum* Trin. as a synonym. (See next paragraph.)

Panicum monobotrys Trin.; Steud. Syn. Pl. 2: 55. 1854. "*P. monostachyum* Salzm. Hrbr. Bahia." A duplicate of the type is in the United States National Herbarium. It is a small plant of *Paspalum pilosum* with sheaths pubescent along the margin and at the summit only. The first glume is described as minute but in our specimen, as in most racemes in this species, the first glume on the secondary spikelet is minute in some spikelets and large and acuminate in others. This was differentiated from *P. monostachyum* H. B. K. under the impression that that species was the same as *Panicum cultratum* Trin.⁹² Trinius later⁹³ referred *P. cultratum* figured in his Icones,⁹⁴ to *P. monostachyum* H. B. K. The plate, which agrees with the type in the Trinius Herbarium in Leningrad, does not represent *P. monostachyum* H. B. K. but a very different plant, *Thrasya cultrata* (Trin.) Nees.⁹⁵ *Panicum monobotrys* Trin. was earlier listed⁹⁶ without description.

Panicum monostachyum var. *minus* Kunth; Doell in Mart. Fl. Bras. 2²: 182. 1877. The name is credited to "Kunth l. c.," but it does not appear in either

of the works cited by Doell nor in any other of Kunth's works. Doell describes the two forms of the first glume and refers Kunth's plate 104, which shows only a minute glume, to var. β .

Dimorphostachys monostachya Fourn. Mex. Pl. 2: 14. 1886. Based on *Panicum monostachyum* H. B. K., though the one specimen cited (Liebmann's no. 220) is *Paspalum unispicatum*.

Dimorphostachys pilosa Fourn. Mex. Pl. 2: 14. 1886. Based on *Paspalum pilosum* Lam.

DESCRIPTION

An olivaceous tufted perennial; culms ascending or spreading, sometimes decumbent at base, 40 to 115 cm. tall, commonly bearing slightly divergent branches from the middle nodes, subcompressed, glabrous or sparsely pubescent below the nodes; nodes densely short-pubescent to glabrous;

sheaths shorter than the internodes, keeled, papillose-pubescent throughout or along the margins and at the summit only; ligule membranaceous, 1 to 1.5 mm. long; blades somewhat spreading, flat or the margins revolute, 10 to 40 cm. long, 3 to 8 (rarely to 10) mm. wide, sublinear, rather stiff, harshly pubescent on both

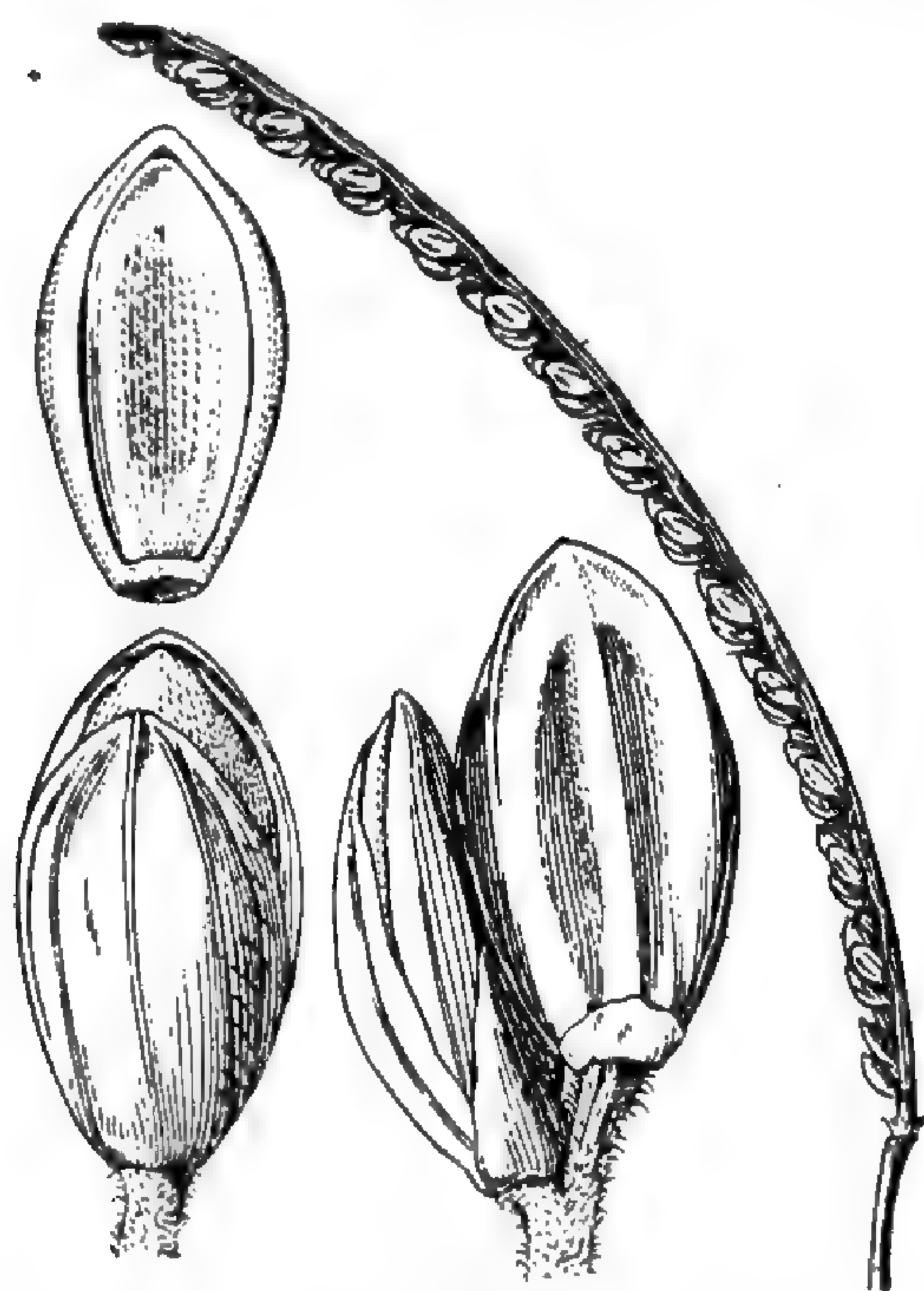


FIGURE 52.—*P. pilosum*. From Hitchcock 8130

⁹¹ Kunth, Rév. Gram. 2: 381. pl. 104. 1830.

⁹² Gram. Pan. 126. 1826. "Brasil (Langsdorff.)"

⁹³ Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 228. 1834.

⁹⁴ Gram. Icon. 2: pl. 145. 1829.

⁹⁵ Agrost. Bras. 95. 1829.

⁹⁶ Steud. Nom. Bot. ed. 2, 2: 260, 272. 1841.

surfaces, rarely sparsely so, and with long stiff hairs at the very base, the pale midvein prominent beneath; peduncles slender, elongate, 1 to 4 from the upper and middle sheaths, sparsely pubescent; racemes solitary, mostly arcuate, 6 to 17 cm. long, the rachis channeled and very narrowly winged with a dense ring of short hairs at the base, the margins from rather sparsely long-ciliate to glabrous, usually with a few scattered hairs; spikelets in pairs, scarcely crowded, 2.6 to 3 mm. long, 1.5 to 1.7 mm. wide, elliptic, rather turgid, glabrous (rarely with a few obscure hairs at the base), the unequal pedicels pubescent; first glume usually minute on the primary spikelet, small to half the length of the spikelet, pointed and eccentric on the secondary, occasionally obsolete on one or both; second glume and sterile lemma 5-nerved, firm in texture, the glume shorter than the fruit, the lemma, especially of the lower spikelet, concave down each side of the mid nerve, the mid nerve often obscure, subindurate and minutely papillose under a lens, inclosing a palea of nearly equal length, thin in the middle and firm on the two keels, and infrequently a staminate flower; fruit about 2.5 mm. long, papillose-striate.

Many of the South American specimens are less pubescent than the typical form. In *Chase* 8534 one of the 5 peduncles bears 2 contiguous racemes.

DISTRIBUTION

Open or sparsely wooded slopes and brushy savannas, mostly in rather moist soil, lowlands, and up to 1,500 meters, Costa Rica to Bolivia and southern Brazil.

COSTA RICA: Nuestro Amo, *Jiménez* 534. San José, *Hitchcock* 8462. Las Con-cavas, *Lankester*. Turrialba, *Pittier* 9055.

PANAMA: David, *Hitchcock* 8365. Baja Boquete, *Killip* 4558. El Boquete, *Hitchcock* 8192, 8298. Cerro Vaca, *Pittier* 5325, 5364. Chorrera, *Hitchcock* 8130. Canal Zone, *Hitchcock* 7988; *Killip* 4011; *Standley* 25205.

TRINIDAD: Port of Spain, *Hitchcock* 9987. St. Joseph, *Hitchcock* 10189. Aripo Savanna, *Hitchcock* 10075. Pitch Lake, *Broadway* 2603; *Hitchcock* 10088. La Brea, *Broadway* 4969.

COLOMBIA: Buenaventura, *Hitchcock* 19909. Mesa de los Santos, *Killip & Smith* 15112. Jamundí, *Pittier* 1539. Cali, *Pittier* 659. Popayan, *Pennell & Killip* 8164.

FRENCH GUIANA: Without locality, *Leprieur* 82.

BRAZIL: Barra do Rio Negro, *Spruce* 22. Alagoinhas, *Chase* 8126. Parafuso, *Chase* 7971. Cachoeira, *Chase* 8083. Bahia, *Chase* 7860, 7890, 8025; *Salzmann*. Viçosa, *Bailey* 1205, 1222. Serra do Cipó, *Chase* 9121. Bello Horizonte, *Chase* 8944. Juiz de Fóra, *Chase* 8531, 8534. Franklin Sampaio, *Dorsett & Popenoe* 215c. Est. Minas Geraes, *Widgren* 871. Chapadinha, *Glaziou* 22579. Est. Goyaz, *Gardner* 3496. Serra de Itatiaia, *Chase* 8346. São Paulo, *Edwall* 3035. Poa, *Holway* 1624. São João, *Holway* 1657. Taipas, *Holway* 1948. Guarulhos, *Holway* 1510. São Caetano, *Holway* 1584. Mogy das Cruzes, *Glaziou* 17909. Jaguarahyva, *Dusén* 17984. Without locality, *Pohl*; *Riedel*.

ECUADOR: Portovelo, *Hitchcock* 21269.

BOLIVIA: Hacienda Casana, *Buchtien* 7108. San Carlos, *Buchtien* 14 and 15 in 1927.

52. *Paspalum unispicatum* (Scribn. & Merr.) Nash

Panicum (*Dimorphostachys*) *unispicatum* Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 24: 14. 1901. "Type specimen 6717 C. G. Pringle, Valley of Oaxaca, State of Oaxaca, July 13, 1897." The type in the United States National Herbarium with the name in Merrill's script is a complete plant with solitary racemes.

Paspalum unispicatum Nash, N. Amer. Fl. 17: 193. 1912. Based on *Panicum unispicatum* Scribn. & Merr.

DESCRIPTION

A leafy rather pale perennial with horizontal scaly rhizomes; culms 1 to few together, erect or ascending, 50 to 80 cm. (occasionally scarcely 20 cm.) tall,

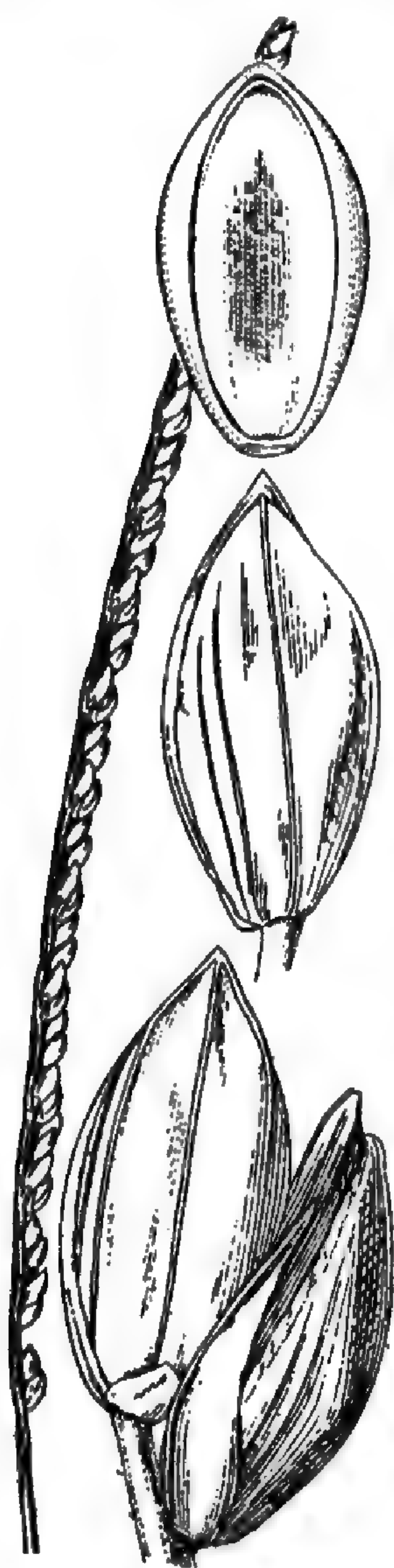


FIGURE 53.—*P. unispicatum*. From type specimen

simple or with a single erect leafy branch from the lower nodes, terete to subcompressed, glabrous; nodes glabrous; sheaths mostly overlapping, papillose-hirsute along the margin, otherwise very sparsely so to glabrous, commonly with a narrow lacerate membranaceous fringe on the collar; ligule membranaceous, 2 to 3 mm. long, with a ring of long hairs back of it; blades flat, suberect to spreading, rather stiff, 10 to 33 cm. long, 8 to 15 mm. wide, rounded at base, attenuate at apex, the uppermost reduced and commonly slender, stiffly papillose-ciliate on the margin, very sparsely (rarely rather copiously) papillose-hirsute on both surfaces to glabrescent or scabrous only, the midvein deeply impressed, the large cells of the upper epidermis easily visible under a lens; peduncles slender, commonly 2 from the upper sheath, the secondary one often wholly or partly included (no axillary racemes found in other sheaths); racemes 1 or 2, usually 1, rather stiffly suberect to slightly arcuate, 6 to 21 cm. long, the nearly straight rachis sometimes with a few long stiff hairs at base, otherwise glabrous; spikelets in pairs, rather crowded, 3 to 3.5 mm. (mostly 3.2 mm.) long, about 1.6 mm. wide, elliptic, somewhat unsymmetrical, especially the lower of the pair, pale, glabrous, the first glume commonly minute and nerveless on the primary spikelet, eccentric, 1-nerved, keeled, acuminate and half to three-fourths as long as the spikelet on the secondary, but exceedingly variable in both, sometimes obsolete; second glume and sterile lemma 5-nerved (occasionally 7-nerved), rather firm in texture, the glume, especially in the lower spikelet, a little shorter than the sterile lemma, the lemma inclosing a palea of nearly equal length, hyaline in the middle and firm on the 2 keels, and often a well-developed staminate flower, rarely a perfect but infertile one; fruit about 2.8 mm. long, pale, minutely papillose-striate.

The extreme variability of the first glume is well shown in *Hitchcock* 5561, where in a single raceme the glume varies from obsolete to more than half the length of the spikelet on the primary spikelet and from minute and nerveless to three-fourths as long as the spikelet on the secondary.

This species is frequently affected by a fungus that distorts the inflorescence

DISTRIBUTION

Meadows, savannas, open slopes and banks, from low altitudes to about 1,500 meters, southern Texas to Venezuela and Argentina; also in Cuba.

TEXAS: Kingsville, *Piper* in 1906.

NUEVO LEÓN: Monterrey, *Hitchcock* 5561.

PUEBLA: Acatzinco, *Nicolas* in 1909.

OAXACA: Oaxaca, *Hitchcock* 6098, 6099. Valley of Oaxaca, *Liebmann* 220; *Pringle* 6717. Cerro de Soledad, *Seler* 1359a (Berlin Herb.).

CUBA: Guane, *Ekman* 11093. Habana, *Léon* 2401. Zaza de Tunas, *Léon* 947. Sancti Spíritus, *Clements* 2427; *Léon* 4099, 5582; *Sergius* 2411, 2682.

VENEZUELA: La Guayra, *Curran & Haman* 889. Caracas, *Bailey* 263; *Pittier* 5924, 6164, 6457, 7228, 7235. San Lázaro, *Pittier* 9743. Macarao, *Pittier* 11553. Gamboa, *Pittier* 9616. Laguna del Espino, *Pittier* 9642.

PARAGUAY: San Salvador, *Rojas* 2743. Puerto Casado, *Rojas* 2313.

ARGENTINA: Corrientes, *Llamas* (*Herb. Parodi*) 3046. Dept. Medinas, *Flora Tucumana* 524. Prov. Tucumán, *Venturi* 2313, 2322, 2395. Córdoba, *Stuckert* 37, (in *Kneucker Gram.*) 367. Prov. Catamarca, *Venturi* 7226. Prov. Santiago del Estero, *Venturi* 5717.

53. *Paspalum monostachyum* Vasey

Paspalum monostachyum Vasey; Chapm. Fl. South U. S. ed. 2. 665. 1883. "South Florida (Garber)." The type, in the United States National Herbarium, bearing the name and notes in Vasey's script, was collected by A. P. Garber (no. 224) at Miami, July, 1877. It consists of two flowering culms, the rhizomes wanting. In one raceme the first glume is developed in one of the pair of spikelets in about half the pairs, in the other raceme it is wanting. The glume is not mentioned in the description, but it is in Vasey's notes on the sheet. There is nothing in the notes to suggest that Vasey had *Panicum monostachyum* H. B. K. in mind.

Paspalum rectum var. *longispicatum* Vasey, Bot. Gaz. 9: 54, 55. 1884. "(*P. monostachyum* Vasey) * * * collected by Dr. Garber, at Miami, Florida." The type of *P. monostachyum* bears a note "*Paspalum rectum* Nees fide Munro," and another "var. *spicii longiori* Munro in Herb. Gr."

Paspalum solitarium Nash in Small, Fl. Southeast. U. S. 77, 1326, 1903. "*Paspalum monostachyum* Vasey, not Walp." In *Walpers Annals*⁹⁷ following *Panicum pseudopaspalus* Nees is the note "Affine *P. monostachyo* Hmbt. et Knth.—*Paspalum monostachyum* Hort." This may better be regarded as incidental mention of a garden name than as publication of a transfer of *Panicum monostachyum* H. B. K. In his later work⁹⁸ Nash himself took this view, reducing *P. solitarium* to a synonym of *Paspalum monostachyum* Vasey. "*Paspalum monostachyum* Willd. hrb." is mentioned without description as synonym of *Panicum monobotrys* Trin.⁹⁹

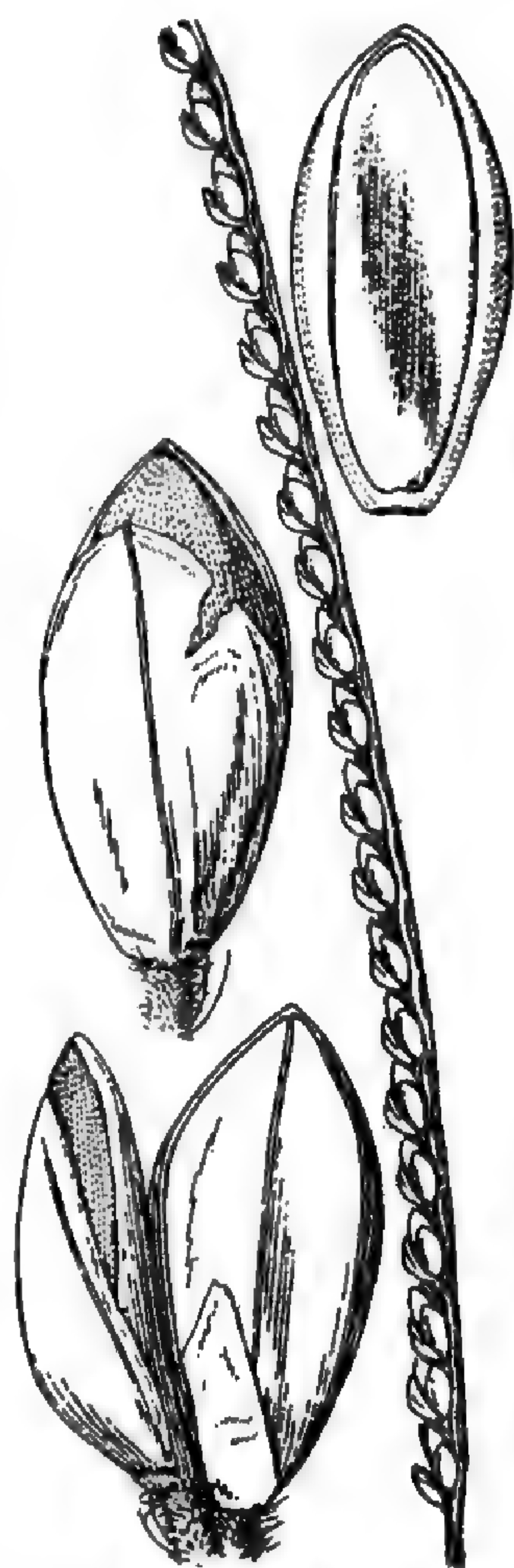


FIGURE 54.—*P. monostachyum*. From type specimen

DESCRIPTION

A slender erect glabrous perennial with horizontal scaly rhizomes, the culms 1 to 4, commonly forming open colonies, 50 to 120 cm. tall, simple, subterete; sheaths about equaling the internodes or longer, sometimes with a few hairs at the slightly auricled summit; ligule membranaceous, about 2 mm. long; blades

⁹⁷ 3:714. 1853.

⁹⁸ N. Amer. Fl. 17: 192. 1912.

⁹⁹ Steud. Nom. Bot. ed. 2. 2: 260, 272. 1841.

folded and erect at base, the junction with the sheath obscure, the margins grown together above, firm, 15 to 65 cm. long, 1 to 2 mm. wide as folded, usually with a few long hairs back of the ligule; peduncles slender, elongate, mostly 1, sometimes 2, the secondary one from the uppermost sheath only, none inclosed; racemes 1 or 2 (usually 1, rarely 3), stiffly erect to slightly arcuate, 10 to 30 cm. long, rarely shorter, the slender nearly straight rachis usually short-ciliate on the margin, commonly with a few hairs at the base; spikelets in pairs, or solitary toward the summit, scarcely crowded, 3 to 3.5 mm. long, about 1.5 mm. wide, subovate-elliptic, pale, glabrous, on nearly equal pubescent pedicels; first glume often developed in a few of the primary spikelets in each raceme, but more commonly wanting or rudimentary; second glume and sterile lemma 3-nerved, rather thin in texture, the glume shorter than the fruit; fruit 2.8 to 3 mm. long, pale, minutely papillose-striate.

In this species the first glume, when developed, is found on the primary spikelet of the pair (the one that is in other species the longer pedicelled) instead of on the secondary spikelets as in the others. It varies from a minute rudiment to a triangular scale two-thirds as long as the spikelet. Besides the type there are 3 duplicates of *Garber* 224. In two the glume is wanting or rudimentary, in the other there are many unusually large glumes. In 39 per cent of all specimens examined the first glume is developed in some of the spikelets.

DISTRIBUTION

Moist places in flatwoods, or coastal dunes, southern Florida and Texas.

FLORIDA: Homosassa, *Combs* 956. Fellsmere, *Tracy* 9390. Palm Beach, *Piper* in 1921. Fort Myers, *Hitchcock* 2459; *J. P. Standley* 248. Alva, *Francis* 4. Miami, *Chase* 3883; *Eaton* 172; *Garber* 224; *Tracy* 9054. Homestead, *Tracy* 9319. Larkins, *Small, Mosier & Small* 6982. Paradise Key, *Mosier* 250.

TEXAS: Texarkana, *Tharp* 4765. Harris County, *Thurrow* in 1891. Cypress, *Thurrow* in 1898. Chambers County, *Tharp* 3112. Galveston, *Fisher* 251; *Hitchcock* 2460; *Tracy* 7395. Tarpon Beach, *Hitchcock* 5434. Without locality, *Drummond* 364; *Nealley* in 1886.

54. *Paspalum adoperiens* (Fourn.) Chase

Dimorphostachys adoperiens Fourn. Mex. Pl. 2: 15. 1886. "Orizaba, * * * (SCHAFFN. n. 271 in herb. FRANQ.)." The type specimen, now in the Drake Herbarium, consists of a tuft, leafy at base. The blades, described as glabrous, are pubescent to glabrescent on both surfaces. No axillary racemes could be felt in the sheaths, but the specimen is immature.

Paspalum guatemalense Bartlett, Proc. Amer. Acad. 43: 49. 1907. "A swamp at Gualan, Department of Zacapa, Guatemala, January 20, 1905, C. C. Deam, no. 427 (type, in hb.

Gray)." The duplicate type in the Deam Herbarium has 3 culms 60 to 95 cm. tall, with axillary peduncles from the upper or upper two sheaths. The second glume of a few of the spikelets is slightly pubescent and very obscurely speckled.

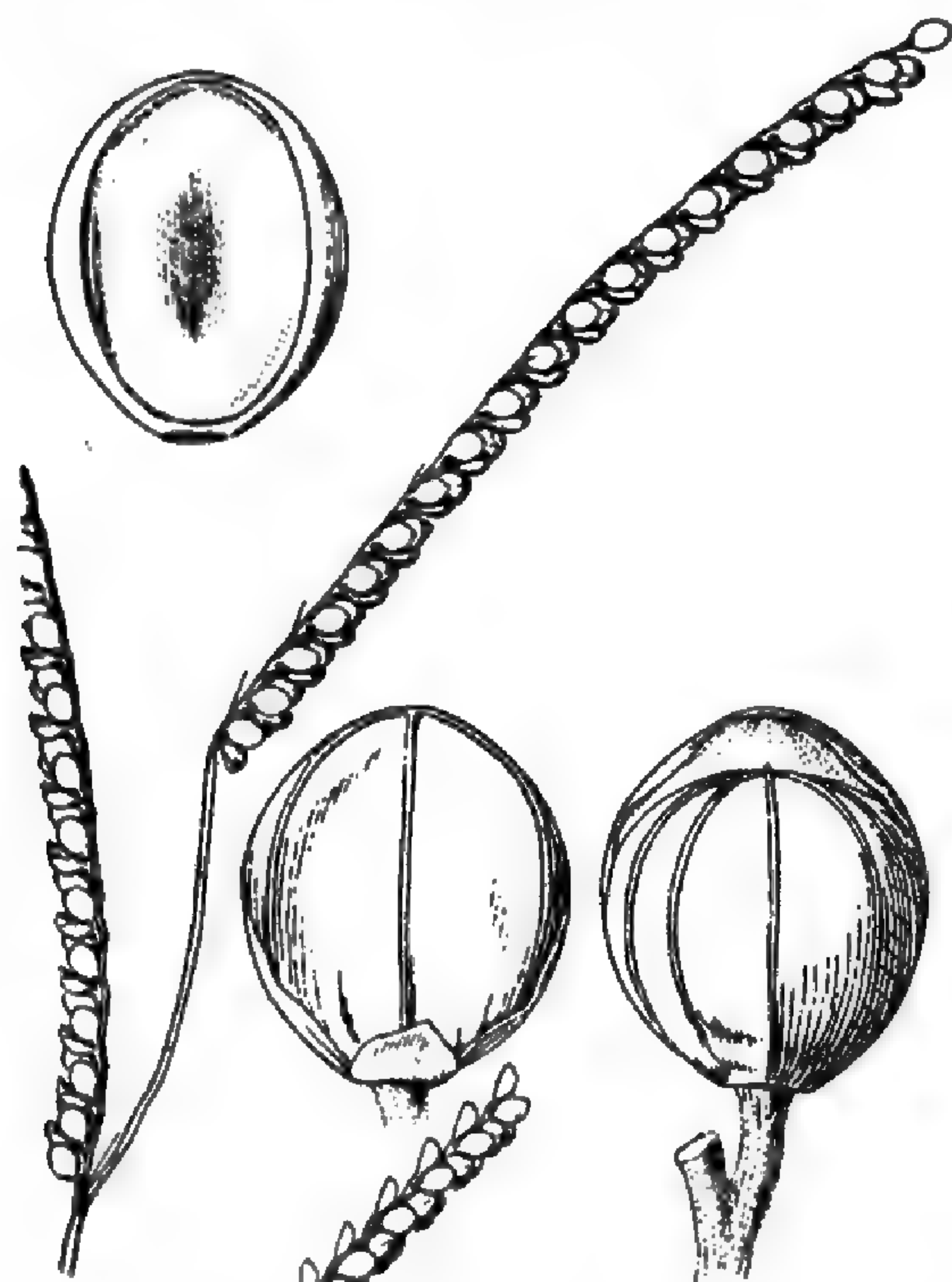


FIGURE 55.—*P. adoperiens*. From type specimen of *P. guatemalense*

DESCRIPTION

A tufted perennial; culms few to several, ascending, 35 to 95 cm. tall, sparingly branching, compressed, strongly ridged, glabrous; nodes glabrous; sheaths sparsely papillose-pilose to nearly glabrous except along the margin; ligule membranaceous, 2 to 3 mm. long; blades flat, ascending, rather firm, 5 to 22 cm., mostly 8 to 12 cm. long, 8 to 16 mm. wide, slightly narrowed to a rounded base, from densely and harshly papillose-pilose on both surfaces to very sparsely pilose or glabrescent; racemes 2 to 4, on axillary peduncles, sometimes solitary, ascending, relatively thick, 3 to 7.5 cm. long, 1.2 to 3.5 cm. distant on a slender channeled common axis (sometimes bearing minute auricles below the racemes as in *P. culiacanum*), the rachis about 0.8 mm. wide, usually with a few hairs at base and occasionally on the margin; spikelets in pairs, crowded, 2.1 to 2.5 mm. long, 1.7 to 1.8 mm. wide, broadly obovate-elliptic to suborbicular, mostly glabrous, pale or tawny, the first glume on both spikelets usually minute, broad and obtuse, occasionally obsolete on the primary spikelet or one-fourth to half as long as the spikelet and pointed on the secondary; second glume and sterile lemma 5-nerved, the glume slightly shorter, sometimes minutely pubescent down the middle or around the margin; fruit slightly smaller than the spikelet, pale, minutely papillose-striate.

In this species the first glumes on the pair of spikelets are scarcely different, that on the secondary usually being only slightly larger, though a few spikelets in an occasional raceme may have well-developed pointed glumes on the secondary spikelet.

DISTRIBUTION

Moist, mostly sandy ground up to 1,500 meters, southern Mexico, Guatemala, and El Salvador.

VERA CRUZ: Zacuapan, *Purpus* 8026.

MEXICO (Republic of): Without locality, *Schaffner* 166.

GUATEMALA: Guatemala City, *Hitchcock* 9079. San Pablo, *Salas* 7. San Felipe, *Maxon & Hay* 3527. Mazatenango, *Kellerman* 5803.

EL SALVADOR: San Salvador, *Calderón* 944; *Standley* 22441, 23271, 23285, 23559, 23596.

55 *Paspalum culiacanum* Vasey

Paspalum culiacanum Vasey, Contr. U. S. Nat. Herb. 1: 281. 1893. "Collected by Dr. Edward Palmer in the mountains of Culiacan (No. 1647) in 1891." The type, bearing the name in Vasey's script, is in the United States National Herbarium. It is labeled "In large bunches around a water hole in the mountains, Lodiego on the Culiacan River," Sinaloa, Mexico.

DESCRIPTION

A tufted perennial in large bunches; culms ascending, 60 to 85 cm. tall, sparingly branching, compressed, strongly ridged, glabrous; nodes glabrous; sheaths sparsely ciliate toward the summit, otherwise glabrous; ligule membranaceous, about 1.5 mm. long; blades flat, ascending, rather firm, 10 to 23 cm. long, 6 to 9 mm. wide, the uppermost reduced, rounded at base, scabrous

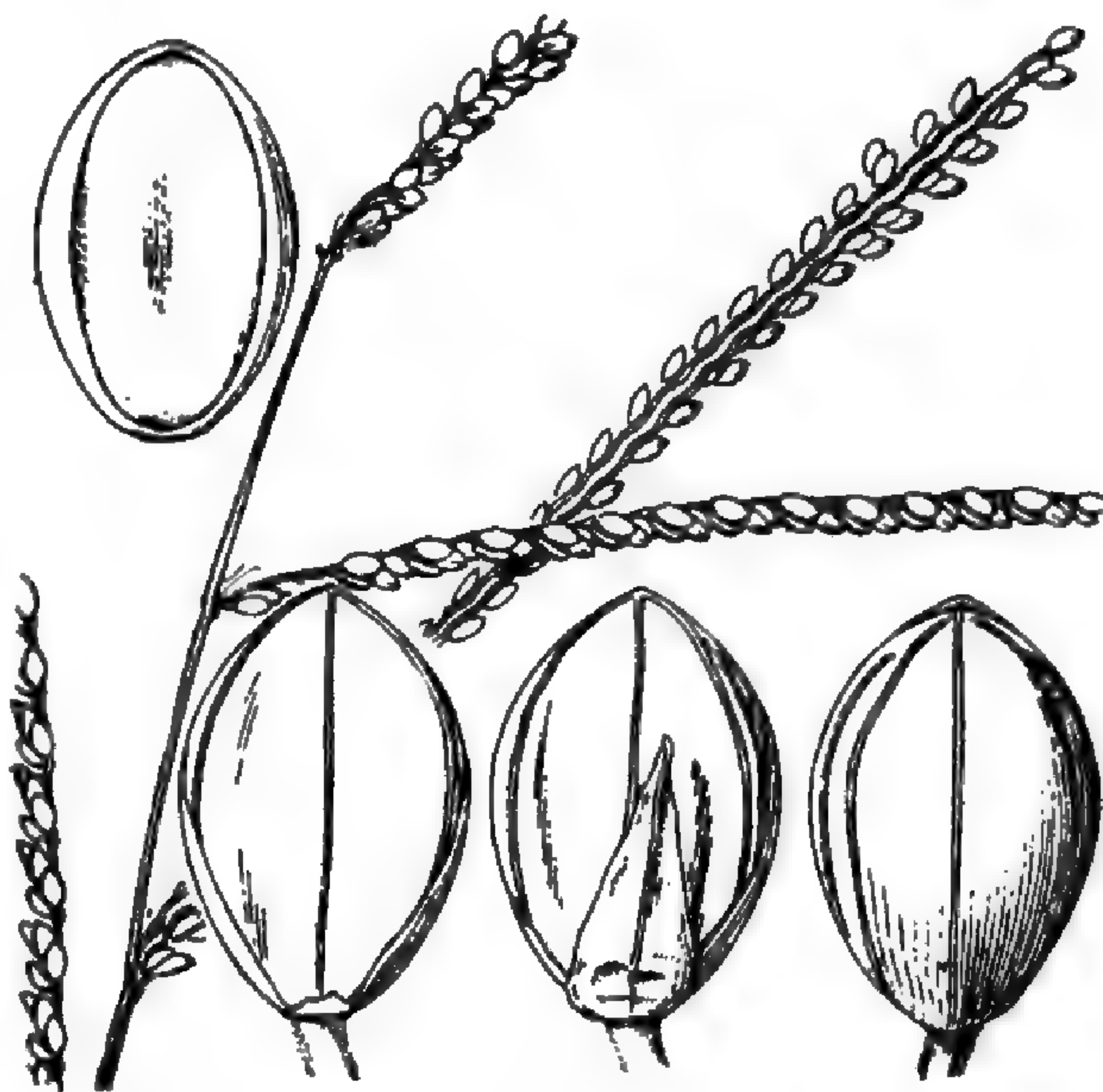


FIGURE. 56—*P. culiacanum*. From type specimen

on the margin and with a few long hairs at the very base, otherwise glabrous; racemes 3 to 8, spreading, 4.5 to 7.5 cm. long, the slender common axis, 3.5 to 7 cm. long, channeled on one side and with a minute auricle on the angles just below the base of the rachises, the angles scabrous, the rachises about 1 mm. wide, with a few hairs at base and rarely a few long hairs on the scabrous margins; spikelets in pairs, scarcely crowded, 2.3 mm. long, 1.5 mm. wide, obovate-elliptic, glabrous, pale or purple-tinged, the first glume minute or obsolete on the primary spikelet, half to two-thirds as long as the spikelet on the secondary, acuminate, 1-nerved; second glume and sterile lemma subequal, barely covering the fruit, 5-nerved; fruit slightly smaller than the spikelet, pale, minutely papillose-striate, the tip obscurely papillose.

Known only from the type collection. In one sheath of one of the two plants there is a wholly included raceme. Possibly this is an exceptional specimen of *P. adoperiens* with nearly glabrous foliage and narrower spikelets.

56. *Paspalum langei* (Fourn.) Nash

Paspalum abbreviatum Trin.; Fourn. Mex. Pl. 2: 10. 1886. "Msc. in herb. Petrop: * * * Absque loco (SCHIEDE n. 888)." Schiede's no. 888, named "*Paspalum abbreviatum* S. & D." [Schiede & Deppe], in the herbarium of the Botanical Garden in Leningrad, evidently the one referred to, is the same as Liebmann's 192 (see below). The description of the plant applies fairly well to this; that of the spikelets does not, but rather to the specimens named *P. abbreviatum* in Trinius' script in the Academy of Natural Sciences (Leningrad) and in the Berlin Herbarium. These are Schiede's no. 885 and "Schiede, Jalapa [distributed by Hahn] 1836." These belong to *P. squamulatum* Fourn. It seems probable that Fournier saw both species named *P. abbreviatum* by Trinius and did not distinguish between them, and that he cited a number he had taken down. The description of the plant applies better to Schiede's no. 888, but as a whole is too uncertain to be taken up in place of *P. langei*. *P. abbreviatum* Trin. was earlier mentioned by Schlechtendal¹ as a new species from Mexico, without description or specimen cited.

In the Trinius Herbarium is a specimen of *P. langei* collected by Schiede, "Mexico Hacienda de la Laguna, 1836," with spikelets scarcely more than 2 mm. long, named *P. senescens* by Trinius. This name was also mentioned without description by Schlechtendal in the note mentioned above.

Paspalum lineare Fourn. Mex. Pl. 2: 12. 1886. Not *P. lineare* Trin. 1826. "Absque loco (LIEBM. n. 192); Chinantla (LIEBM. n. 187)." Liebmann's no. 192 in the Copenhagen Herbarium bears the name in Fournier's script, and is taken as the type. In this specimen the first glume is nearly obsolete in all but the terminal spikelets. The spikelets are 2.2 mm. long.

Dimorphostachys drummondii Fourn. Mex. Pl. 2: 15. 1886. Not *Paspalum drummondii* C. Muell. 1861. Several specimens are cited, the last "Texas (DRUMM.)," because of the name, is taken as the type. On the label of Drummond's no. 350 in the Paris Herbarium "*Paspalum abbreviatum* Trin." and two unpublished names are crossed out and "*Dimorphostachys Drummondii* n. sp." is added, all in Fournier's script. There are 2 plants, each with 2 racemes; the spikelets nearly 2.5 mm. long.

Panicum squamatum Fourn. Mex. Pl. 2: 18. 1886. Not *Paspalum squamatum* Steud. 1854. "Mundo Nuevo (KARW. n. 982)." This specimen is also cited by Fournier under *Dimorphostachys drummondii*. Fournier differentiates *P. squamatum* from *Dimorphostachys* because the first glumes are alike on both spikelets.

¹ *Linnaea* 26: 383. 1854.

Karwinsky's no. 982 in the herbarium of the Botanical Garden, Leningrad, is named *D. drummondii* by Fournier, but the first glumes are alike in both spikelets of the pair. Doubtless Fournier later described *P. squamatum* and failed to take out the citation under *D. drummondii*.

Dimorphostachys langei Fourn. Mex. Pl. 2: 14. 1886. "Hacienda de Jovo (LIEBM. n. 186); Mecapalco, maio (LIEBM. n. 179 part)." Liebmann's no. 186 in the Copenhagen Herbarium, bearing the name in Fournier's script, consists of 3 fragments with overmature inflorescences, most of the spikelets fallen. The one in which a few spikelets remain is not the form for which the name *P. langei* has come into use, but appears to be the same as that described by Fournier as *Dimorphostachys adoperiens* on the following page. The other two fragments may be the form that has recently been called *P. langei*. The description was evidently drawn up from both Liebmann's collections, nos. 186 and 179 in part. The description of the spikelets as "ovato-orbicularibus" does not apply to no. 179 in part, but to those of the fragmentary no. 186, while "spiculis pubescentibus" in the key (p. 14) applies to Liebmann's no. 179. The specimen of Liebmann's 179 in the Copenhagen Herbarium, named *D. langei* by Fournier, is selected as the type because it is the form to which Nash applied the name and which has since been known as *P. langei*. *Paspalum variable* was also distributed by Liebmann under no. 179.

Paspalum drummondii Vasey, Contr. U. S. Nat. Herb. 3: 18. 1892. Not *P. drummondii* C. Muell. 1861. Based on *Dimorphostachys drummondii* Fourn. In Index Kewensis² this name is erroneously listed as *Panicum drummondii* Vasey, the citation referring to *Paspalum drummondii* Vasey, Contr. U. S. Nat. Herb. 2: 499. 1894.

Paspalum oricola Millsp. & Chase, Field. Mus. Bot. 3: 28. f. 28, 29. 1903 (February). "Island of Cozumel, Millspaugh Pl. Utowanae 1480." The type, in the Field Museum of Natural History, is much like the type of *D. drummondii* Fourn.; that is, the shorter-leaved, nearly glabrous form.

Dimorphostachys ciliifera Nash in Small, Fl. Southeast. U. S. 78, 1327. 1903 (July). "Type, Manatee, Fla., Simpson, no. 97, 1890, in Herb. U. S. Dept. Agric." This specimen, now in the National Herbarium, is a single complete plant 1.1 meter tall and unusually robust, with sparsely papillose-pubescent sheaths and blades, the blades 11 to 28 cm. long, 4 racemes, and spikelets 2.7 to 2.8 mm. long. The original description reads "racemes 2 or 3, * * * second and third scales (second glume and sterile lemma) 5-nerved, the former glabrous, the latter sparingly pubescent with short appressed hairs." In the type there are 4 racemes on the primary peduncle (the axillary one hidden in the sheath), and the second glumes are pubescent. The description was obviously drawn in part from other specimens.

Paspalum ciliiferum Hitchc. Contr. U. S. Nat. Herb. 12: 201. 1909. Based on *Dimorphostachys ciliifera* Nash.

Paspalum langei Nash, N. Amer. Fl. 17: 179. 1912. Based on *Dimorphostachys langei* Fourn.

DESCRIPTION

A rather slender olivaceous perennial in tufts of few to several culms; culms ascending, 30 to 100 cm. tall, mostly simple, but occasionally with a single leafy branch, compressed, glabrous; nodes glabrous; sheaths keeled, pubescent along the margin and often on the collar, otherwise glabrous to sparsely papillose-

²Suppl. 1: 312. 1906.

pubescent; ligule membranaceous, about 1 mm. long; blades flat, ascending, usually rather thin, 10 to 40 cm. long, 6 to 15 mm. wide, tapering to a narrow base or, especially the upper, rounded at base, scabrous and often sparsely ascending-ciliate on the margin, and with long hairs on the upper surface at the very base, otherwise from glabrous to appressed papillose-pubescent on the upper surface and sparsely pubescent below (more commonly nearly glabrous); peduncles slender, 1 to 3 rather short-exserted from the upper sheath, the axillary ones usually appearing late, the racemes often partly included, axillary racemes also often borne in the middle sheaths, mostly partly or wholly included; racemes 2 to 5 (rarely to 7), arcuate or subflexuous, ascending to spreading, 3.5 to 11 cm. long, mostly rather distant on a slender channeled axis 7 to 14 cm. long, the rachis with a few long hairs at the base and occasionally along the margin; spikelets in



FIGURE 57.—*P. langei*. From Pringle 3991

pairs, not crowded, 2.2 to 2.6 mm. long (rarely only 2 mm. or as much as 2.8 mm.), 1.3 to 1.4 mm. wide, elliptic-obovate, olive-green, turning brown at maturity and in drying, the first glume minute (rarely nearly obsolete) on the primary spikelet, with a ciliate brownish hyaline margin, usually acuminate and one-fourth to one-third as long as the spikelet on the secondary, occasionally alike on both spikelets; second glume and sterile lemma 5-nerved, finely pubescent and sparsely to copiously speckled with brown glandular spots, the glume slightly shorter than the sterile lemma, the summit of the fruit exposed at maturity; fruit 2.1 to 2.3 mm. long, pale, minutely papillose-striate.

This species varies from the relatively small, nearly glabrous form with shorter blades, like the type specimens of *Dimorphostachys drum-*

mondii and *Paspalum oricola*, to the tall, long-leaved, pubescent form, like the type of *Dimorphostachys ciliifera*, but no two characters separating these extremes remain coupled. Only two specimens with glabrous sterile lemmas, given by Nash³ as a character of *P. langei*, have been seen, *Seaton* 112a and *Hitchcock* 9078. The latter has pubescent blades, more than 40 cm. long (characters assigned to *P. ciliiferum*). No specimens have been seen with spikelets having glabrous second glumes.

Hitchcock's nos. 8630, 8681, 8686, and 8744, all from Nicaragua, are coarse, rather robust plants resembling *Paspalum botterii*.

DISTRIBUTION

Moist woods and shaded slopes and banks, occasionally in open ground, mostly at low altitudes, Florida, Texas, and the Greater Antilles to Venezuela.

FLORIDA: Orange Bend, *Chase* 4092, 4096. Grasmere, *Combs & Baker* 1151. Manatee, *Simpson* 97.

LOUISIANA: Lake Charles, *Chase* 4398, 4415; *Langlois* in 1893. Cameron, *Cocks* 3010.

³ N. Amer. Fl. 17: 179. 1912.

TEXAS: Tom Green County, *Tweedy* in 1879. San Antonio, *Hitchcock* 2461, 5251. Industry, *Wurzlöw* 1894. Pierce, *Tracy* 7369. Hempstead, *Hall* 803. Houston, *Fisher* 116, 260, 2012; *Nealley* in 1884; *Reverchon* 4174, *Tharp* 2024. Sheldon, *Reverchon* 4176. Lavaca River, *Plank* 87. Columbia, *Bush* 264, 963. San Jacinto River, *Tharp* 4259. Trinity Bay, *Joor* in 1884. Brownsville, *Hanson* 499. Without locality, *Drummond* 350; *Nealley* in 1884, 1885, and 1888.

NUEVO LEÓN: Monterrey, *Hitchcock* 5562, 5573.

TAMAULIPAS: Chamal Hacienda, *Wootton* in 1919. Without locality, *Runyon & Tharp* 4028.

SAN LUIS POTOSÍ: Las Canoas, *Pringle* 3991. Sierra de Guascama, *Purpus* 5423. San Luis Potosí, *Virlet* 1323 (Paris Herb.).

VERA CRUZ: Hacienda de Jovo, *Liebmann* 188 (6329). Jalapa, *Hitchcock* 6644½. Córdoba, *Hitchcock* 6417. Pital, *Liebmann* 184. Colipa, *Liebmann* 185.

PUEBLA: Orizaba, *Seaton* 112a.

GUERRERO: Iguala, *Rose, Painter & Rose* 9383.

HONDURAS: La Ceiba, *Standley* 56737.

EL SALVADOR: Colina de Santa Tecla, *Calderón* 1744. Volcano San Salvador, *Hitchcock* 8956. Dept. Ahuachapán, *Padilla* 594.

NICARAGUA: Corinto, *Hitchcock* 8744. Masaya, *Hitchcock* 8630. Jinotepe, *Hitchcock* 8681, 8686, 8724. San Juan del Sur, *Hitchcock* 8606.

CUBA: Mariel, *Ekman* 11497, in *Amer. Gr. Nat. Herb.* 934. Habana, *Léon* 934. Guatao, *Léon* 6321. Tapaste, *Léon* 4183. Arroyo Naranjo, *Léon* 587. Marianao, *Léon* 1511. Río Bacuranao, *Wilson & Léon* 11602. Matanzas, *Britton & Wilson* 148.

HAITI: Morne Cap-Rouge, *Ekman* H 5948. Trouin, *Ekman* H 2376.

VENEZUELA: Caracas, *Sydow* 6.

57. *Paspalum variabile* (Fourn.) Nash

?*Panicum* (*Harpostachys*) *pseudopaspalus* Nees, *Linnaea* 24: 236. 1851. Described from a specimen grown in a greenhouse, Breslau, the native country not given. The type has not been found. The description applies well to *Paspalum variabile*, but is scarcely detailed enough for certainty. It is said to be "affine *P[anicum] monostachyum* Humb. et Kth.," which is the same as *Paspalum pilosum* Lam. In any case the specific name would be an unfortunate one under *Paspalum*. The name appeared earlier without description in a seed list⁴ from the botanical garden of Breslau.

?*Paspalum haenkeanum* Nees, *Linnaea* 24: 236, 1851, as synonym of *Panicum pseudopaspalus* Nees. Not *Paspalum haenkeanum* Presl, 1830. The name is also given in the Breslau seed list mentioned above under *P. pseudopaspalus*.

Dimorphostachys schaffneri Fourn. Mex. Pl. 2: 15. 1886. Not *Paspalum schaffneri* Griseb. 1886. Several collections are cited, of which the one Schaffner collection, without number from Mirador, is taken as the type. This specimen, in the Fournier Herbarium in the Paris Herbarium, is named, "*Panicum Schaffneri* Griseb. ms. ipse." It consists of a single plant with nearly mature inflorescence.

Panicum schaffneri Griseb.; Fourn. Mex. Pl. 2: 15. 1886, as synonym of *Dimorphostachys schaffneri* Fourn.

Dimorphostachys schaffneri var. *remotispicula* Fourn. Mex. Pl. 2: 15. 1886. No specimen is cited and none has been found so named by Fournier. The variety is differentiated by "Spicis brevioribus, spiculis laxis."

⁴Delect. Sem. Hort. Vrat. 1850. We have been unable to verify this reference. The new species from this and other seed lists were described in *Linnaea* the following year (see above).

Dimorphostachys variabilis Fourn. Mex. Pl. 2: 15. 1886. "Absque loco (GHIESBREGHT in herb. Mus. Par.); Orizaba (BOTT. in meo herb.)." The Ghiesbreght specimen in the Paris Herbarium without locality other than Mexico, bearing the name in Fournier's script, is taken as the type. This is a dense clump, the inflorescences nearly mature.

Brachiaria grossaria Griseb.; Fourn. Mex. Pl. 2: 15, 1886, as synonym of *Dimorphostachys variabilis*. No specimen so named by Grisebach has been found.

Dimorphostachys ghiesbreghtii Fourn. Mex. Pl. 2: 16. 1886. "Absque loco (GHIESBR. in herb. Mus. Paris)." This specimen from Mexico, bearing the name in Fournier's script, consists of a tuft with a single flowering culm and several leafy shoots.

Paspalum schaffneri Scribn. Field Mus. Bot. 2: 24. 1900. Not *P. schaffneri* Griseb. 1886. Based on *Dimorphostachys schaffneri* Fourn. Plate 56, referred to in the text, was not published until later⁵ and represents *Paspalum oricola*, now referred to *P. langei*.

Paspalum variabile Nash, N. Amer. Fl. 17: 180. 1912. Based on *Dimorphostachys variabilis* Fourn.

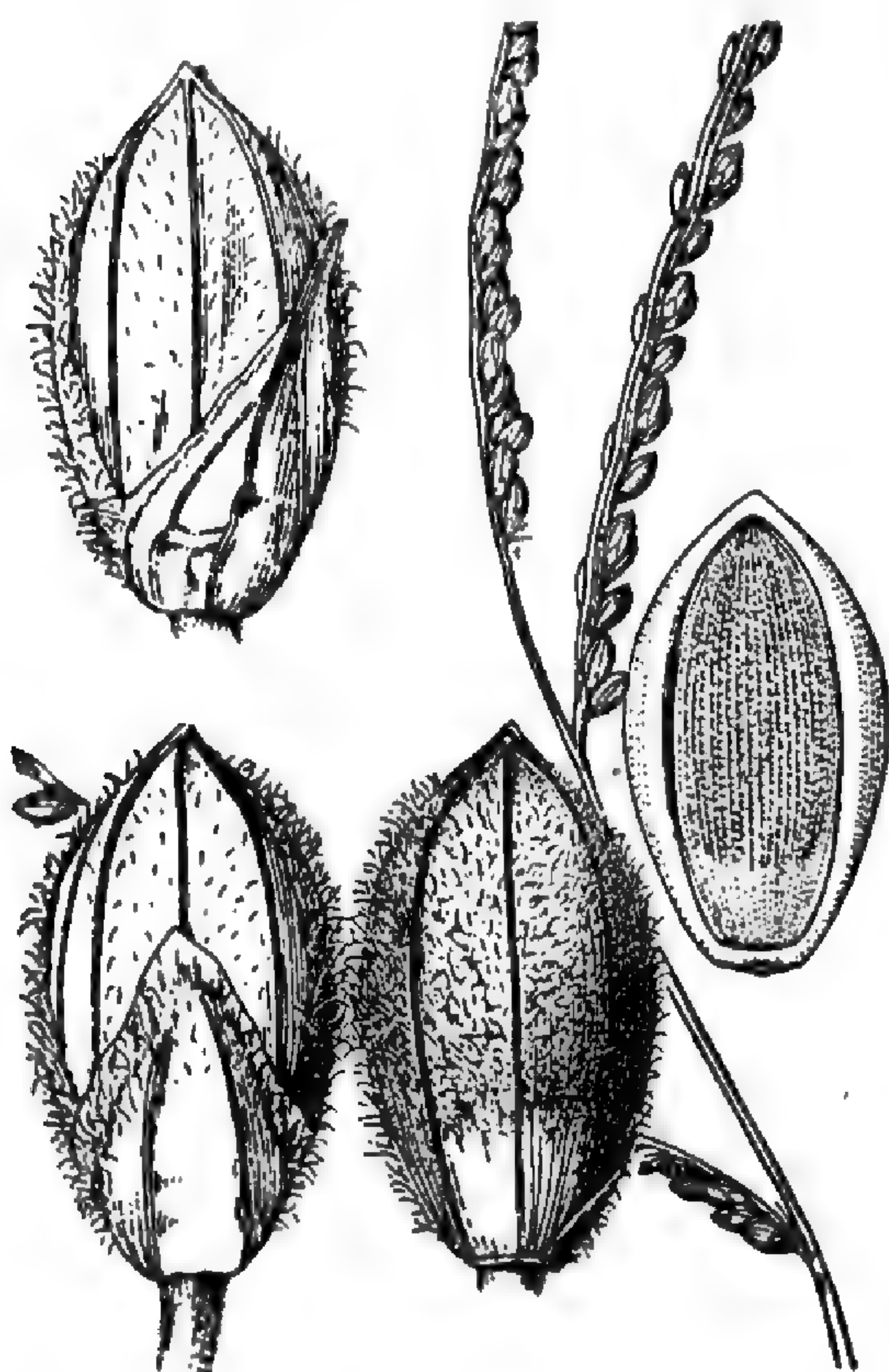


FIGURE 58.—*P. variabile*. From type of *P. ghiesbreghtii* and Hitchcock 6645

DESCRIPTION

A leafy perennial in tufts of few to several culms, occasionally in dense tufts; culms erect or ascending, 70 to 100 cm. tall, mostly simple, occasionally with a single leafy branch, compressed, glabrous; nodes glabrous; sheaths keeled, pubescent along the margin and sparsely so on the collar, otherwise glabrous; ligule membranaceous, 2 to 3 mm. long; blades flat, ascending, relatively firm, 10 to 30 cm. long, 7 to 18 mm. wide, tapering to a rounded base, the upper reduced and broadest at the base, usually ciliate on the scabrous margin, pilose back of the ligule and commonly sparsely appressed-pubescent toward the apex on both surfaces, otherwise glabrous or nearly so; peduncles slender, 1 to 3 from the upper sheath, the axillary mostly solitary, commonly borne in all but the lower sheaths but often hidden; racemes 2 to 4, rarely 1, on the primary peduncle, usually 1 on the axillary, relatively thick, ascending, 4 to 9 cm. long, rather distant on a slender angled axis, the rachis sometimes with a few hairs at base; spikelets in pairs, scarcely crowded, 2.9 to 3.2 mm. long, about 1.7 mm. wide, elliptic-obovate, olive brown toward maturity, the first glume well developed on both of the pair of spikelets and usually increasing in size toward the end of the raceme, that of the primary spikelet with a brownish hyaline margin, mostly 2-nerved, one-fifth to two-thirds the length of the spikelet, pubescent and sometimes glandular spotted near the margin, mostly subglabrous otherwise, that of the secondary spikelet eccentric, long-pointed and strongly keeled toward the apex, 1 to 3 nerved, half to three-fourths as long as the spikelet, the hyaline margin very narrow, obscure; second glume and sterile lemma subequal, 5-nerved, pubescent, the glume at maturity copiously speckled with brown glandular spots except

⁵ Ibid 3: 29. 1903, no plate number being given.

at the base, barely covering the fruit, the apex of the lemma minutely pointed; fruit about 2.7 mm. long, pale, minutely papillose-striate.

Fournier differentiates *Dimorphostachys schaffneri*, *D. variabilis*, and *D. ghiesbreghtii*, mostly on the width of the blades, but almost the entire range of variation is found in a single plant, as in Hitchcock's no. 6439.

DISTRIBUTION

Open or brushy slopes, mostly in rich soil, at middle altitudes, Mexico and Costa Rica.

VERA CRUZ: Jalapa, *Hitchcock* 6608, 6644, 6645; *Schiede* 885. Córdoba, *Bourgeau* 1658; *Hitchcock* 6411, 6439; *Kerber* 24. Huitamalco, *Liebmann* 177. Mirador, *Liebmann* 178. Mecapalco, *Liebmann* 179 in part. Orizaba, *Bourgeau* 2598; *Hitchcock* 6323. Chinantla, *Liebmann* 168.

MORELOS: Cuernavaca, *Hitchcock* 6833.

COSTA RICA: Guanacaste, *Jiménez* 387.

58. *Paspalum palmeri* Chase, sp. nov.

Paspalum setaceum Michx. var. *pubiflorum* Vasey, Contr. U. S. Nat. Herb. 1: 114. 1891. Not *Paspalum pubiflorum* Rupr. 1886. "Grew in a swampy place, many plants together, Alamos [Mexico], September 16 to 30. No. 704," Palmer. The type specimen in the United States National Herbarium and 3 duplicates seen all consist of the upper parts of flowering culms with 2 leaves each.

DESCRIPTION

A slender olivaceous perennial, culms probably 70 cm. or more tall, compressed, glabrous; nodes glabrous; sheaths keeled, pubescent along the margin, otherwise glabrous; ligule membranaceous, 1 to 2 mm. long; blades flat, ascending to spreading, rather firm, 8 to 15 cm. long, 7 to 8 mm. wide, tapering from a rounded base to an attenuate apex, scabrous and somewhat appressed-hispid on the margin, sparsely appressed-pubescent on both surfaces toward the apex and with long stiff hairs back of the ligule; peduncles slender, 1 or 2 from the upper sheath; axillary racemes also borne in the middle sheaths, mostly partly included; racemes 1 to 3, commonly 2, ascending to spreading, 3.5 to 8 cm. long, the slender angled common axis 1.5 to 3 cm. long, the rachis usually without long hairs in the axils; spikelets in pairs, somewhat crowded, 2.8 mm. long, 1.5 mm. wide, elliptic-obovate, pale greenish brown, the first glume obsolete or nearly so on the primary spikelet, from small nerveless and obscure to strongly nerved, acuminate and half the length of the spikelet on the secondary, glabrous; second glume and sterile lemma equal, 5 (rarely 7) nerved, softly pubescent and speckled with pale glandular spots; fruit about 2.5 mm. long, pale, minutely papillose-striate.

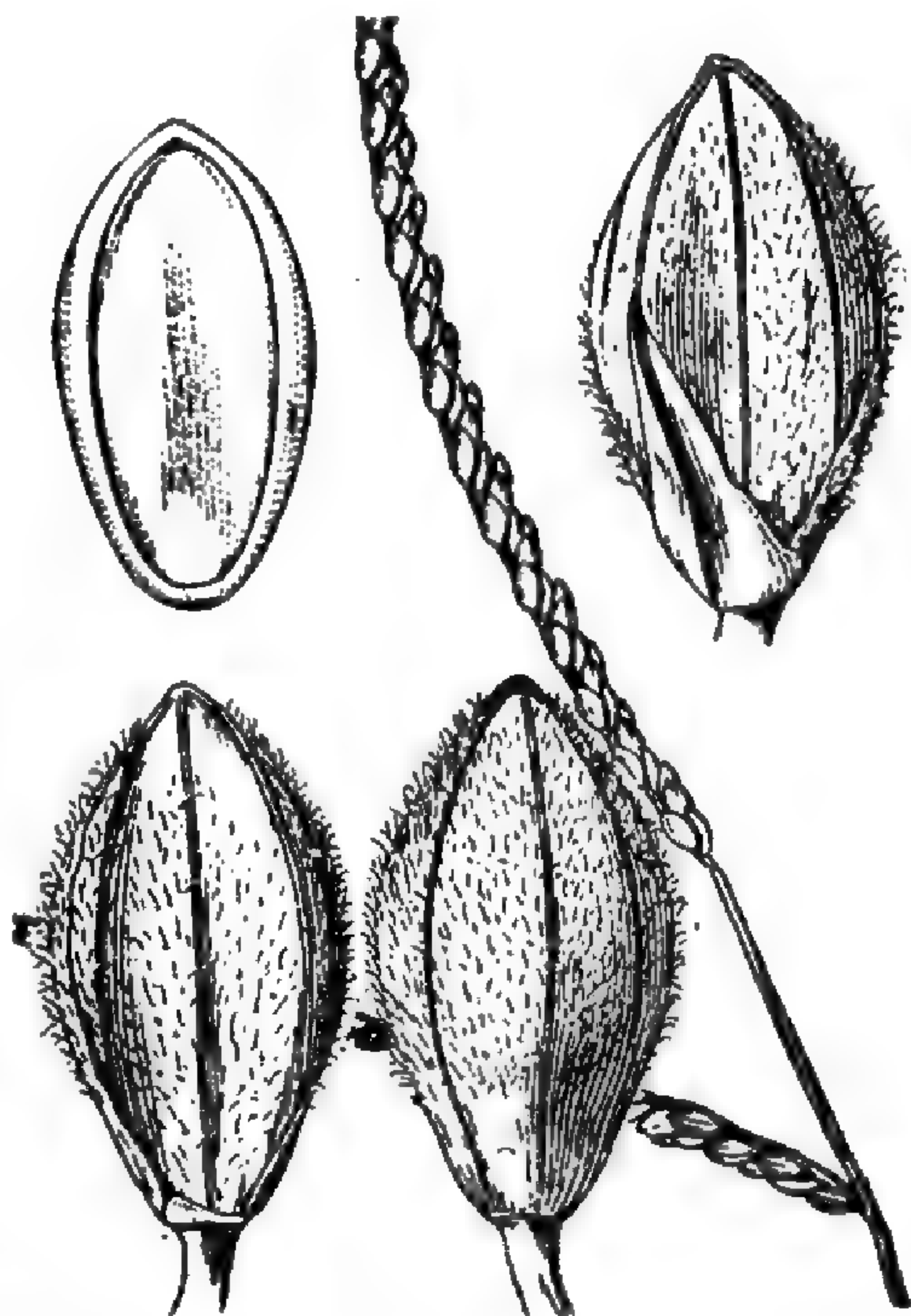


FIGURE 59.—*P. palmeri*. From type specimen

The spikelets of *Palmer* 704 are immature. They probably turn brown and become more glandular at maturity.

Type in the U. S. National Herbarium, no. 951577 (the type of *P. setaceum* var. *pubiflorum* Vasey) collected "from a swampy place, many plants seen but a short grower" at Alamos, Sonora, Mexico, September 16-30, 1890, by Edward Palmer (no. 704).

Known only from the type collection.

59. *Paspalum botterii* (Fourn.) Chase

Paspalum macrophyllum var. *piliferum* Fourn. Mex. Pl. 2: 11. 1886. "Orizaba (BOTT. n. 117, julio); Consoquitla (LIEBM. n. 117, agosto); Santa Maria Tlatella (LIEBM. n. 168, junio)." Specimens of Botteri's no. 117 were examined in the Paris Herbarium and in the herbaria of the British Museum and of Henslow Museum, Cambridge. In all the first glume of the secondary spikelet varies from nearly obsolete to more than half the length of the spikelet. The specimen in the Paris Herbarium is named "*Paspalum varians*" in Fournier's script (see below). Liebmann's no. 167 (erroneously cited as 117) and 168 were examined in the Copenhagen Herbarium. The first is named "*Paspalum macrophyllum* H. B. K." in Fournier's script, with "*Paspalum varians* Fourn." written below in his script; the second is named "*Paspalum varians* Fourn." in his script. In these the first glume is large and pointed in most of the secondary spikelets.

Paspalum varians Rich.; Fourn. Mex. Pl. 2: 11. 1886. Mentioned without description in comparison with *P. abbreviatum* Trin. Botteri's no. 117 in the Paris Herbarium is named "*Paspalum varians* n. sp." in Fournier's script, as well as the two Liebmann collections mentioned above.

Dimorphostachys botterii Fourn. Mex. Pl. 2: 14. 1886. "Prope Orizaba, agosto (BOTT. n. 118)." The type, bearing the name in Fournier's script, in the Paris Herbarium, consists of part of a culm with two leaves and a panicle of 10 racemes.

Dimorphostachys paspaloides Fourn. Mex. Pl. 2: 14. 1886. "Vera Cruz (GOUIN n. 32 et 33)." A specimen of Gouin's no. 32, with the name in Fournier's script and with detailed notes by Gouin, in the Paris Herbarium, is taken as the type. This is a tall plant without the base, bearing 6 racemes.

Paspalum botterii Chase, Journ. Washington Acad. Sci. 13: 436. 1923. Based on *Dimorphostachys botterii* Fourn.

Nash⁶ refers this species to *Paspalum macrophyllum* H. B. K. An examination of the type of that, however, shows it to be a species not known from North America.

DESCRIPTION

A leafy perennial in tufts of few to several culms; culms ascending, 60 to 130 cm. tall, sometimes sparingly branching, compressed, glabrous; nodes glabrous; sheaths often overlapping, keeled toward the summit, from glabrous to papillose-hirsute, especially toward the summit; ligule membranaceous, about 3 mm. long, mostly lacerate; blades flat, ascending, usually relatively firm, but sometimes thin, 14 to 40 cm. long (commonly 20 to 30 cm.), 1 to 2.4 cm. wide (usually 1.5 to 1.8 cm.), the lower often long-tapering to a narrow base, the upper rounded to subcordate, scabrous on the margin, and with a ring of stiff hairs back of the ligule, otherwise from glabrous to harshly papillose-pubescent on both surfaces; terminal panicles short-exserted until maturity, of 4 to 15 arcuate-spreading racemes, the common axis slender, glabrous, the racemes distant or, when several, the upper approximate; axillary inflorescences infrequently developed, of 1 to 3 racemes usually wholly or partly included in the sheaths; racemes 6 to 14 cm. long, the slender rachis usually with a few hairs at base; spikelets in pairs,

⁶ N. Amer. Fl. 17: 179. 1909.

mbriate, 2.3 to 2.6 mm. long, about 1.4 mm. wide, elliptic-obovate, rather turgid, light brownish, turning olive-brown, the first glume obsolete on the primary spikelets, commonly developed on most of the secondary, but in some specimens only on a few, strongly eccentric and mostly more than half the length of the spikelet, 1-nerved, pointed, closely appressed and often obscure even when well developed; second glume and sterile lemma 5-nerved, the glume slightly shorter than the fruit, appressed-pubescent with very fine hairs, the lemma glabrous to sparsely pubescent; fruit about 2 mm. long, pale, minutely papillose-striate.

DISTRIBUTION

Banks of streams and ditches and moist open or partly wooded slopes at middle altitudes, Mexico and Guatemala.

SAN LUIS POTOSÍ: Las Canoas, *Hitchcock* 5760; *Pringle* 3779.

SINALOA: Rancho del Burro, *Ortega* 4102.

JALISCO: Tequila, *Palmer* 144 in 1886.

VERA CRUZ: Jalapa, *Hitchcock* 6603.

Orizaba, *Botteri* 659; *Hitchcock* 6328, 6347, 6377. Córdoba, *Hitchcock* 6416.

PUEBLA: Mt. Orizaba, *Seaton* 112a.

MORELOS: Cuernavaca, *Hitchcock* 6826.

COLIMA: Alzada, *Hitchcock* 7074.

OAXACA: Tomellín, *Hitchcock* 6209.

Oaxaca, *Conzatti & González* 1160; *Hitchcock* 6153, 6182, 6185.

GUATEMALA: Guatemala City, *Hitchcock* 9078. Secanquím, *Goll* 80.

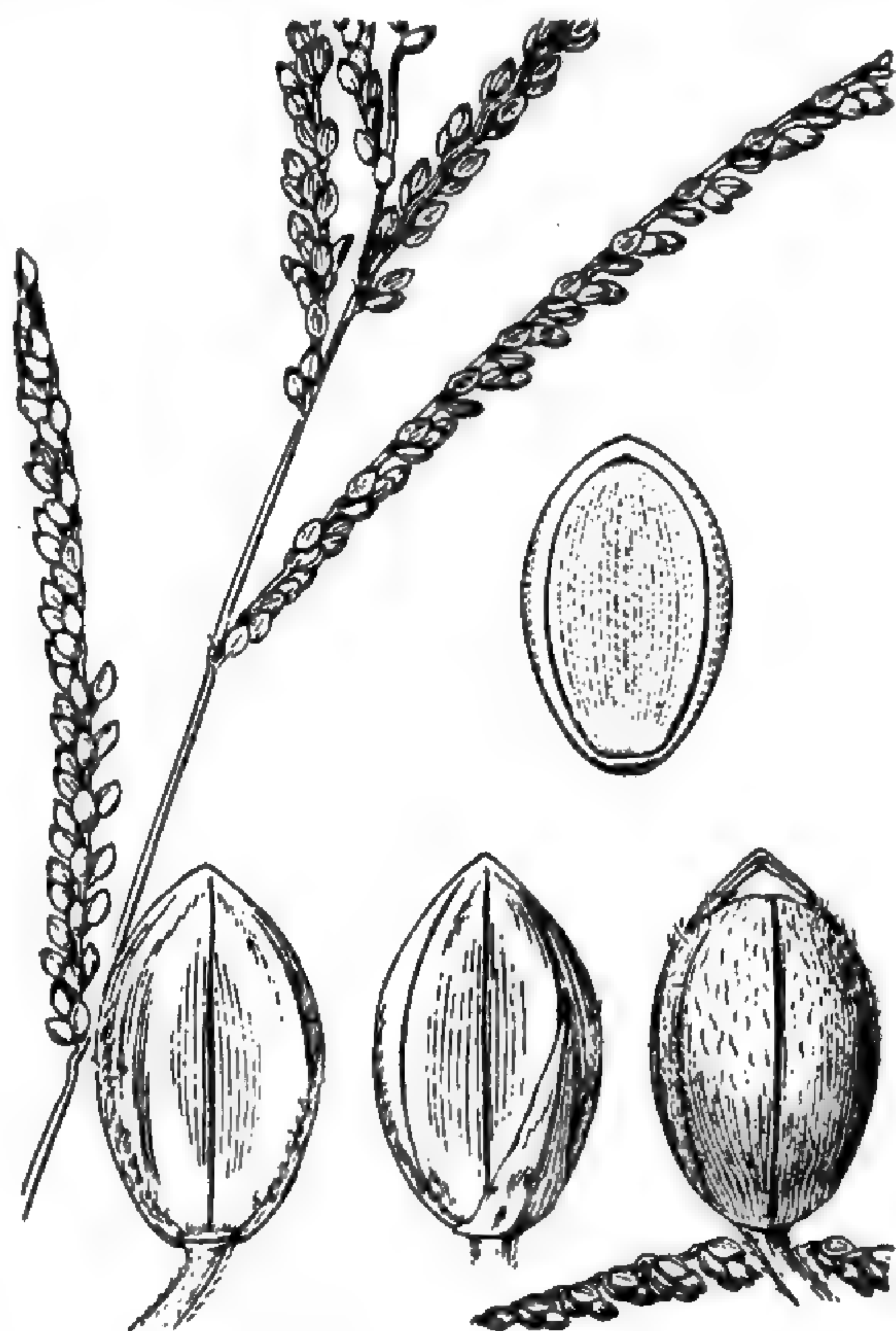


FIGURE 60.—*P. botterii*. From *Botteri* 118 and 659

Corcovadensia.—Tufted perennials with relatively large flat lax blades and several to many racemes. Grouped with the Brazilian *Paspalum corcovadense* Raddi, but hardly a natural aggregation.

Spikelets broadly ovate or obovate, glabrous or nearly so.....65. *P. virletii*.
Spikelets elliptic or narrowly obovate.

Foliage velvety throughout.....61. *P. tenellum*.

Foliage not velvety.

Racemes mostly more than 15, arcuate.....60. *P. affine*.

Racemes not more than 12, straight.

Blades 1 to 2.5 cm. wide.....64. *P. costaricense*.

Blades not more than 1 cm. wide.

Glume papillose-pubescent.....62. *P. jaliscanum*.

Glume obscurely finely pubescent.....63. *P. tonduzii*.

60. *Paspalum affine* Steud.

Paspalum affine Steud. Syn. Pl. 1: 24. 1854. "Oaxaca." The type, bearing the name in Steudel's script, is in the Lenormand Herbarium in the Institut de Botanique at Caen. It consists of part of a culm and a detached panicle with 15 arcuate-spreading racemes.

This is the species to which Fournier,⁷ Nash,⁸ and Chase⁹ misapplied the name *P. conspersum* Schrad. The type of that was examined later in the Berlin Herbarium; it is a species of the *Virgata* group.

DESCRIPTION

A rather stout leafy, olivaceous perennial; culms ascending, commonly geniculate at base, sometimes decumbent at base and rooting at the lower nodes, simple or sparingly branching from the middle nodes, 1 to 2 meters tall, strongly compressed, glabrous; nodes sparsely hispid; sheaths overlapping, slightly keeled, coarsely and sparsely tuberculate-hispid, or the lower glabrate; ligule firm-membranaceous, about 2 mm. long; blades flat, ascending to spreading, 15 to 50 cm. long, 1.2 to 2.3 cm. wide (the uppermost reduced), rounded at base, acuminate, bearing long stiff tawny hairs on the upper surface at the very base, otherwise glabrous or very sparsely tuberculate-hispid near the mid nerve on the upper surface, the margin sharply scabrous; panicle nodding, of 10 to 31

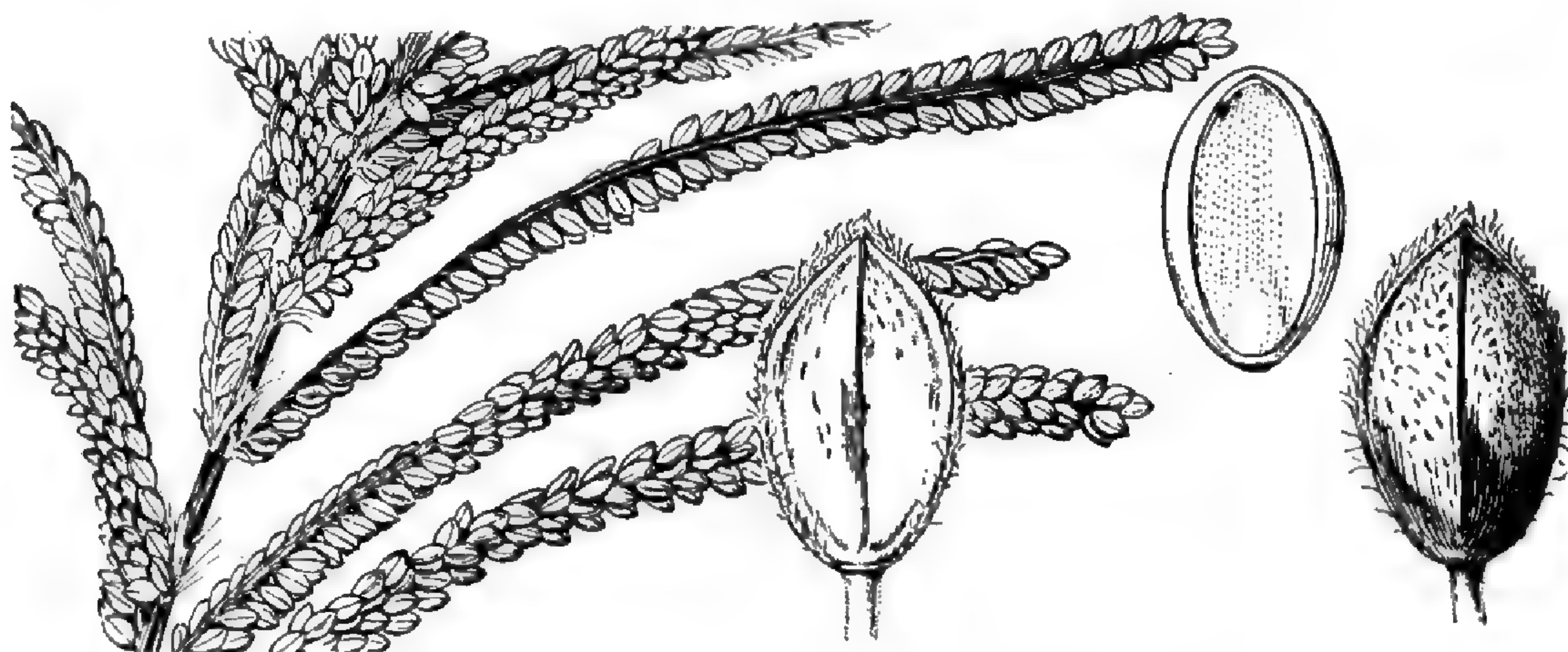


FIGURE 61.—*P. affine*. From type specimen and Hitchcock 6613

ascending to drooping racemes, the lower 7 to 11 cm. long, the upper gradually shorter, aggregate on a strongly angled common axis 8 to 18 cm. long; rachis 0.5 to 0.7 mm. wide, with copious long hairs at the very base; spikelets in pairs on minute pedicels, crowded, 2 to 2.3 mm. long, about 1.5 mm. wide, obovate-elliptic, commonly obscurely apiculate; glume and sterile lemma equal, covering the fruit, 3-nerved, the glume silky-pubescent near the margin, sparsely so to nearly glabrous otherwise, the lemma glabrous, both tan-olivaceous, speckled or blotched with purple or brown; fruit 2 mm. long, pale, smooth and shining.

DISTRIBUTION

In swamps and rich moist open or brushy ground, up to 1,300 meters altitude, Mexico and Guatemala.

VERA CRUZ: Jalapa, Hitchcock 6613, 6617; Pringle 9211. Mirador, Liebmann 169.

Orizaba, Botteri in 1857. Zacuapan, Purpus 5981.

GUATEMALA: Puerto Barrios, Hitchcock 9154. Without locality, Türckheim 161.

61. *Paspalum tenellum* Willd.

Paspalum tenellum Willd. Enum. Pl. 89. 1809. Described from a specimen in the Berlin Botanic Garden, the native country unknown. The type was examined in the Willdenow Herbarium in Berlin.

⁷ Mex. Pl. 2: 239. 1886.

⁸ N. Amer. Fl. 17: 190. 1912.

⁹ In Hitchc. Contr. U. S. Nat. Herb. 17: 239. 1913.

Paspalus elegans Flüge, Monogr. Pasp. 183. 1810. Flüge states that the seed of this grass was sent to Montpellier by Cavanilles and later to other gardens; that his specimen was given him by Rohdé and Willdenow. Flüge's own herbarium has not been located.¹⁰ In the Willdenow Herbarium are two specimens so named, one *P. tenellum*; the other, bearing also an unpublished name of Willdenow's, is a different species. Flüge cites Willdenow's diagnosis of *P. tenellum*, saying that if it be the same, the name "tenellum" is misleading, the plant being rather robust.

Paspalum pubescens Lag. Gen. & Sp. Nov. 2. 1816. Not *P. pubescens* Muhl. 1809. "H[abitat] in Havana. Introd. ann. 1804 ex seminibus per D. Sessé et Mar. Espinosa missis." The type specimen, in the herbarium at the Jardin Botánico at Madrid, was grown in that garden. A duplicate sent by Lagasca is in the Munich Herbarium. Sessé collected in Mexico, whence the seed distributed by Cavanilles probably came originally.

Paspalum lagascae Roem. & Schult. Syst. Veg. 2: 317. 1817. Based on *P. pubescens* Lag. This name has been widely misapplied to the South American *P. ferrugineum* Trin. and allied species.

Paspalum robustum Link; Steud. Nom. Bot. ed. 2. 2: 273, 1841, as synonym of *P. elegans* Flüge.

Paspalum liebmanni Fourn. Mex. Pl. 2: 11. 1886. The name was earlier listed by Hemsley without description.¹¹ "Paso de Ovejo (LIEBM. n. 189, agosto)." Dr. Carl Christensen, of the University Botanical Museum, Copenhagen, writes that the specimen can not be found in that herbarium. The description appears to indicate a specimen of *P. tenellum* with approximate racemes.

Paspalum tenellum β *bourgaei* Fourn. Mex. Pl. 2: 12. 1886. The name was earlier listed by Hemsley without description.¹² "Tizapan in valle Mexicensi * * * (BOURG. n. 1150); Pedregal * * * (BOURG. n. 452)" are the only Bourgeau specimens cited. Both are in the Paris Herbarium; no. 1150, bearing the name in Fournier's script, is taken as the type.

DESCRIPTION

A softly pubescent perennial in clumps of few to several culms from a knotted base of very short rhizomes; culms suberect to ascending, 30 to 150

cm. tall, simple or branching from the lower nodes after the maturity of the primary panicle, compressed, angled, glabrous; nodes short-pubescent or glabrous; sheaths mostly shorter than the elongate internodes, densely to sparsely velvety papillose-pubescent, or glabrous toward the base, rarely throughout, the summit with a minute auricle on each side; ligule about 3 mm. long; blades flat or in age reflected (the under surface folded together), 8 to 25 cm. long, 8 to 21 mm. wide (the uppermost reduced), rounded at base or somewhat narrowed, densely velvety pubescent to sparsely soft-pubescent on both surfaces; panicle long-exserted, of 3 to 17, commonly 5 to 10, spreading to ascending rather thick racemes, the lower 2 to 8 cm. long, the others gradually shorter, the common axis flattened,



FIGURE 62.—*P. tenellum*. From type collection in Munich Herbarium and Hitchcock 6922

¹⁰ See p. 1.

¹¹ Biol. Centr. Amer. Bot. 3: 479. 1885.

¹² Biol. Centr. Amer. Bot. 3: 482. 1885.

strongly angled, glabrous; rachis 1 mm. wide, with a few long hairs at the base, otherwise glabrous; spikelets in pairs on slender glabrous pedicels, crowded, 1.9 to 2.1 mm. long, about 1.2 mm. wide, obovate-elliptic, turgid; glume and sterile lemma equal, covering the fruit, 5-nerved, the glume densely papillose-villous, the lemma pubescent with shorter hairs, the margins commonly glabrous, both at first yellowish green, toward maturity speckled or blotched with brownish purple; fruit about 1.8 mm. long, stramineous, smooth and shining.

DISTRIBUTION

Open, mostly moist ground, depressions in rocky slopes, and along ditches and roadsides, between 700 and 2,500 meters altitude, Mexico and Central America; also in Ecuador and Brazil.

SONORA: La Colorado, *Clokey* 1928.

JALISCO: Guadalajara, *Pringle* 11239. Zapotlán, *Hitchcock* 7121, 7133. San Nicolás, *Hitchcock* 7208. Ciudad Guzmán, *Collins* in 1921.

MEXICO: Federal District, Valley of Mexico, *Bourgeau* 1150; *Hitchcock* 5955; *Pringle* 6474; *Rose, Painter & Rose* 9455. City of Mexico, *Holway* 3065. Mixcoac, *Arsène* 8272.

MORELOS: Cuernavaca, *Hitchcock* 6883.

MICHOACÁN: Maravatio, *Hitchcock* 6922. Jacuaro, *Hitchcock* 6955. Morelia, *Arsène* 2377, 2644, and in 1909.

GUATEMALA: Guatemala City, *Hitchcock* 9093, 9099; *Tonduz* 685. La Aurora *Morales* 715.

EL SALVADOR: Volcano San Salvador, *Hitchcock* 8934, 8935, 8958.

BRAZIL: Bahia, *Salzmann*.

ECUADOR: Between Loja and San Lucas, *Hitchcock* 21464.

62. *Paspalum jaliscanum* Chase

Paspalum jaliscanum Chase in *Hitchc. Contr. U. S. Nat. Herb.* 17: 240. 1913. "Type in the U. S. National Herbarium, no. 691236, collected in the lower forest region, at about 2,300 meters altitude, Zapotlán to Nevada de Colima, Jalisco, Mexico, September 23, 1910, by A. S. Hitchcock (no. 7153)." In this specimen the racemes are shorter and more crowded than in other specimens seen.

DESCRIPTION

A slender suberect perennial, the culms solitary or few in a loose clump from a stout rhizome with harsh-pubescent scales, the leaves somewhat aggregate toward the base; culms simple, about 1 meter tall, compressed, glabrous; nodes sparsely appressed-hirsute to nearly glabrous; sheaths sparsely papillose-hirsute along the margin and toward the summit, overlapping on the short lower internodes; ligule 3 mm. long; blades flat or the margins loosely revolute, 12 to 20 cm. long, 12 to 15 mm. wide (the elongate upper sheath bladeless or nearly so), tapering to the base, or those of the mid culm rounded, pilose with long stiff hairs on the upper surface at base and sparsely pilose to glabrous otherwise, rather glossy, the large cells of the epidermis plainly visible under a lens, the lower surface glabrous or nearly so, the mid nerve prominent beneath, the margin inconspicuously stiffly ciliate; panicle long-exserted, 8 to 10 cm. long, of 5 to 12 ascending to spreading rather thick racemes, the lower sometimes with short branchlets at base, 4 to 7 cm. long, the others gradually shorter, the main axis slender but stiff, angled, glabrous; rachis 0.6 to 0.7 mm. wide, with a few long hairs at base, otherwise glabrous; spikelets in pairs on slender glabrous pedicels, irregularly crowded, 2.2 to 2.3 mm. long, about 1.3 mm. wide, elliptic, the flat side slightly depressed down the middle; glume and sterile

lemma subequal, barely or scarcely covering the fruit, 3-nerved, the glume papillose-pubescent and speckled or blotched with brownish purple, the lemma glabrous or papillose-pubescent down the middle, usually with purplish blotches; fruit about 2.2 mm. long, often slightly unsymmetrical, smooth and shining, stramineous.

DISTRIBUTION

Wooded slopes, southern Mexico, between 1,500 and 2,300 meters altitude.

JALISCO: Zapotlán, Mt. Nevada, *Hitchcock* 7153, 7240.

VERA CRUZ: Chinantla, *Liebmann* 199. Without locality, *Liebmann* 196.

63. *Paspalum tonduzii* Mez

Paspalum tonduzii Mez, Repert. Sp. Nov. Fedde 15: 72. 1917. "Costarica, in Maydis culturis ad Sta. Rosa du Copey, alt. 1800 m. * * * (Herb. inst. phys.-geogr. no. 11767)." This specimen, in the Berlin Herbarium, bearing the name in Mez's script and collected by Tonduz, consists of two plants without base. The right-hand plant agrees much better with the description and is taken as the type. The left-hand plant is *P. costaricense*. The spikelets of *P. tonduzii* are described as "glaberrimae," but the second glume is obscurely pubescent toward the summit.

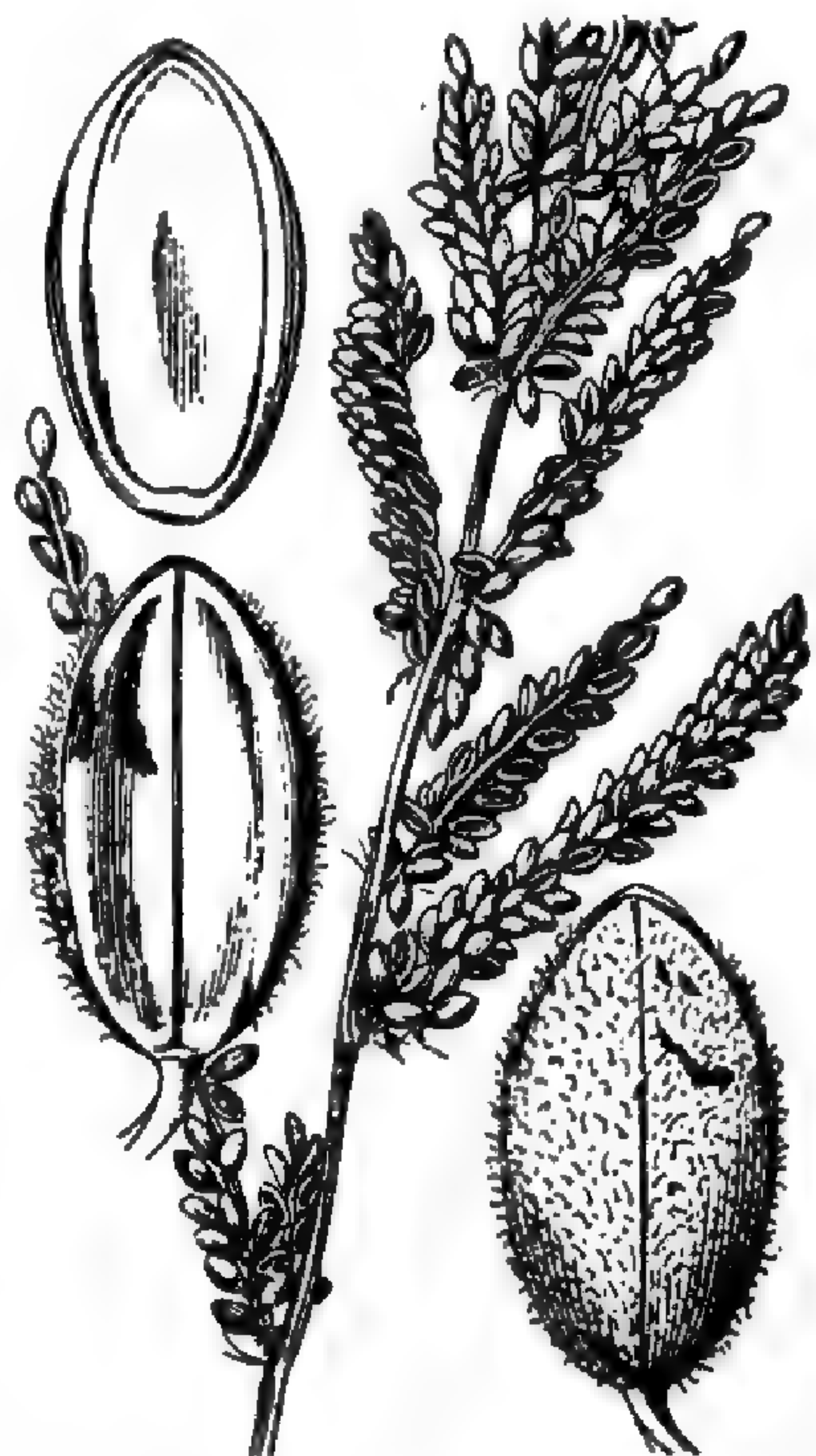


FIGURE 63.—*P. jaliscanum*. From type specimen

DESCRIPTION

Similar to *P. jaliscanum*, but the leaves not aggregate toward the base, the sheaths and blades coarsely papillose-pilose throughout; panicle short-exserted from the bladeless upper sheath, 9 to 11 cm. long, of 8 racemes, the axis and rachises dark purple; spikelets in pairs, irregularly crowded except toward base of the raceme, there the secondary of the pair of spikelets often rudimentary, 2.1 mm. long, 1.1 mm. wide, obovate-elliptic; second glume and sterile lemma 3-nerved, bronze-brown mottled with dull purple, the glume slightly shorter than the fruit, obscurely pubescent with fine appressed hairs toward the summit, the lemma glabrous; fruit 2 mm. long, stramineous, smooth and shining.

This species is known from a single collection. Besides the type only two specimens of this collection have been seen, one in the Brussels Herbarium, the other in the United States National Herbarium. It is very closely related



FIGURE 64.—*P. tonduzii*. From type collection

to *P. jaliscanum*, which is known from only four collections. Further material may show the two to be extremes of a single species. In *Tonduz* 11767 in the United States National Herbarium one of the racemes bears a short branch at the base, and another has an abortive branch with rudimentary spikelets.

64. *Paspalum costaricense* Mez

Paspalum costaricense Mez, Repert. Sp. Nov. Fedde 15: 72. 1917. "Costa Rica, ad San José (Herb. inst. phys.-geogr. Cost. no. 8038,)" is the only collection cited from Costa Rica. The specimen, collected by Tonduz, in the Berlin Herbarium, bearing the name in Mez's script, is taken as the type.

DESCRIPTION

A leafy perennial in dense clumps, drying olivaceous or brown; culms ascending or erect from a spreading base, 25 to 85 cm. tall, simple, compressed, glabrous; nodes blackish, glabrous; sheaths rather broad and loose, keeled, the lower minutely pubescent with pilose margins, the upper ciliate only, or rarely very sparsely pubescent; ligule rather firm, about 3 mm. long; blades flat, spreading, thin, 6 to 22 cm. long, 1 to 2.5 cm. wide, narrowed to a rounded base, ciliate on the margin, otherwise glabrous or, less frequently, sparingly pilose; racemes 3 to 10, commonly 5 to 7, 2 to 6 cm. long, on a slender angled axis 3 to 10 cm. long, ascending to spreading, commonly arching, the lower distant; rachis purple, 1 mm. wide, with a few long hairs at base; spikelets in pairs on slender pedicels, densely crowded, 2.1 to 2.2 mm. long, about 1.2 mm. wide, elliptic, subacute,

olivaceous to dull brown; glume and sterile lemma thin, equal, covering the fruit at maturity, 3-nerved, or the glume faintly 5-nerved, the nerves blackish, the glume minutely appressed-pubescent, the lemma glabrous or obscurely appressed-pubescent; fruit about the size and shape of the spikelet, pale.

The specimen collected by Gollmer, near La Guayra, Venezuela, cited by Doctor Mez was examined in the Berlin Herbarium. This is not *P. costaricense*, but a species of the Decumbentes group. *Paspalum costaricense* is remarkable for its large blades. It resembles *P. mandiocanum* Trin. of Brazil, but in that species the culms are branching and the spikelets much broader for their length.

DISTRIBUTION

Humid wood borders, thickets or partly shaded grassland, sometimes a weed in coffee plantations, at middle altitudes, Guatemala and El Salvador to Costa Rica.

GUATEMALA: El Quetzal, *Salas* 380. Chaculá, *Seler* 2707. Cobán, *Türckheim* 440, (*Dist. Smith*) 658. La Aurora, *Morales* 728a. Without locality, *Tonduz* 769.

EL SALVADOR: Volcán San Salvador, *Calderón* 486; *Hitchcock* 8957, 8959; *Standley* 22824, 22874. Volcán San Vicente, *Standley* 21482, 21493.

COSTA RICA: San José, *Hitchcock* 8489; *Tonduz* 3017, 8038. Between San Pedro de Montes de Oca and Curridabat, *Standley* 32865, 41278. Copey, *Tonduz* 11767 in part. San Francisco de Guadalupe, *Pittier* 16119; *Jiménez* in 1910.

65. *Paspalum virletii* Fourn.

Paspalum virletii Fourn. Mex. Pl. 2: 12. 1886. "San Luis de Potosi (VIRLET, n. 1329)." The Virlet specimen in the Fournier Herbarium in the Paris Herbarium, bearing the name in Fournier's script, is no. 1319, not 1329. It consists of a single culm with two sterile shoots at the base.



FIGURE 65.—*P. costaricense*. From type collection

DESCRIPTION

A slender perennial; culm ascending, the lower node geniculate, simple, 40 cm. tall, glabrous; nodes, sheaths and blades softly pilose, the ligule 1.5 mm. long, the blades flat, lax, 10 to 14 cm. long, 6 to 8 mm. wide, slightly narrowed to a rounded base; racemes 5, spreading, 4 to 5.7 cm. long, on a slender axis 5.5 cm. long; rachis slender, with a few long hairs at the base; spikelets in pairs on minute 3-angled pedicels, imbricate, 2 mm. long, 1.5 mm. wide, broadly ovate, strongly plano-convex stramineous, the glume and sterile lemma equal, barely covering the fruit, thin, 3-nerved, the glume very minutely pubescent, the lemma glabrous; fruit nearly the size and shape of the spikelet, pale stramineous.

The above description is based on notes on the type, the only specimen seen, and the drawing is made from a photograph of the type and a sketch made in the Paris Herbarium. The inflorescence is overmature, many of the spikelets fallen. As mounted, the second raceme is pressed up against the axis but is drawn in what is assumed to be a natural position. No data are on the label other than those given above.

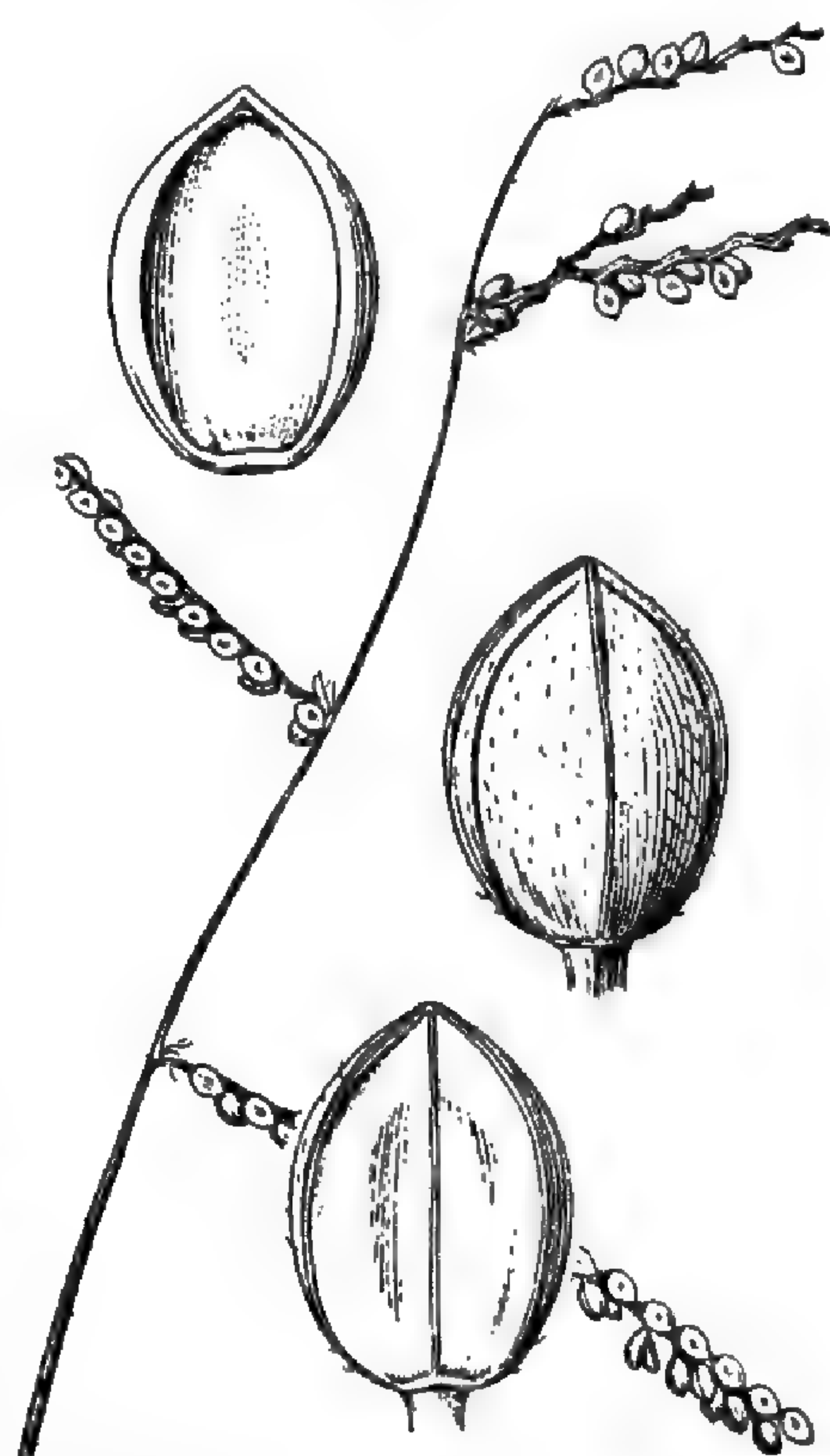


FIGURE 66.—*P. virletii*. From type specimen

Paniculata.—Tufted perennials with flat mostly pubescent blades, several to many slender racemes (or few in *P. squamulatum*) and small hemispheric or broadly obovate turgid spikelets.

Spikelets glabrous.

Blades stiff, elongate.....66. *P. nesiotes*.

Blades lax, not more than 15 cm. long.....67. *P. squamulatum*.

Spikelets pubescent.

Spikelets subangular-obovate.....68. *P. oligostachyum*.

Spikelets hemispheric.

Spikelets 1.7 to 1.9 mm. long, not densely crowded.....69. *P. lentiginosum*.

Spikelets not more than 1.5 mm. long, usually less, crowded.

Pubescence of spikelets gland-tipped.....70. *P. yucatanum*.

Pubescence of spikelets not gland-tipped.....71. *P. paniculatum*.

66. *Paspalum nesiotes* Chase, sp. nov.

DESCRIPTION

An erect slender nearly glabrous perennial; culms 45 to 120 cm. tall, compressed, bearing simple flowering branches from the middle nodes after the maturity of the primary panicle; sheaths, except the lowermost, elongate, keeled toward the summit, glabrous; ligule 2 to 3 mm. long; blades flat from a keeled base, or folded or subinvolute toward the apex, 25 to 50 cm. long, 6 to 11 mm. wide, nearly linear, the base equal in width to the summit of the sheath, the junction inconspicuous, glabrous on the lower surface, scabrous to minutely hispidulous on the upper, the margin very scabrous; panicles finally long-exserted, of 5 to 14 ascending to arching racemes, these 4 to 10 cm. long, irregularly spaced on

a slender angled axis; rachis about 0.8 mm. wide usually with a few hairs at the base; spikelets in pairs on slender scabrous pedicels, loosely and irregularly crowded, 1.9 to 2 mm. long, about 1.5 mm. wide, rounded-obovate, glabrous,

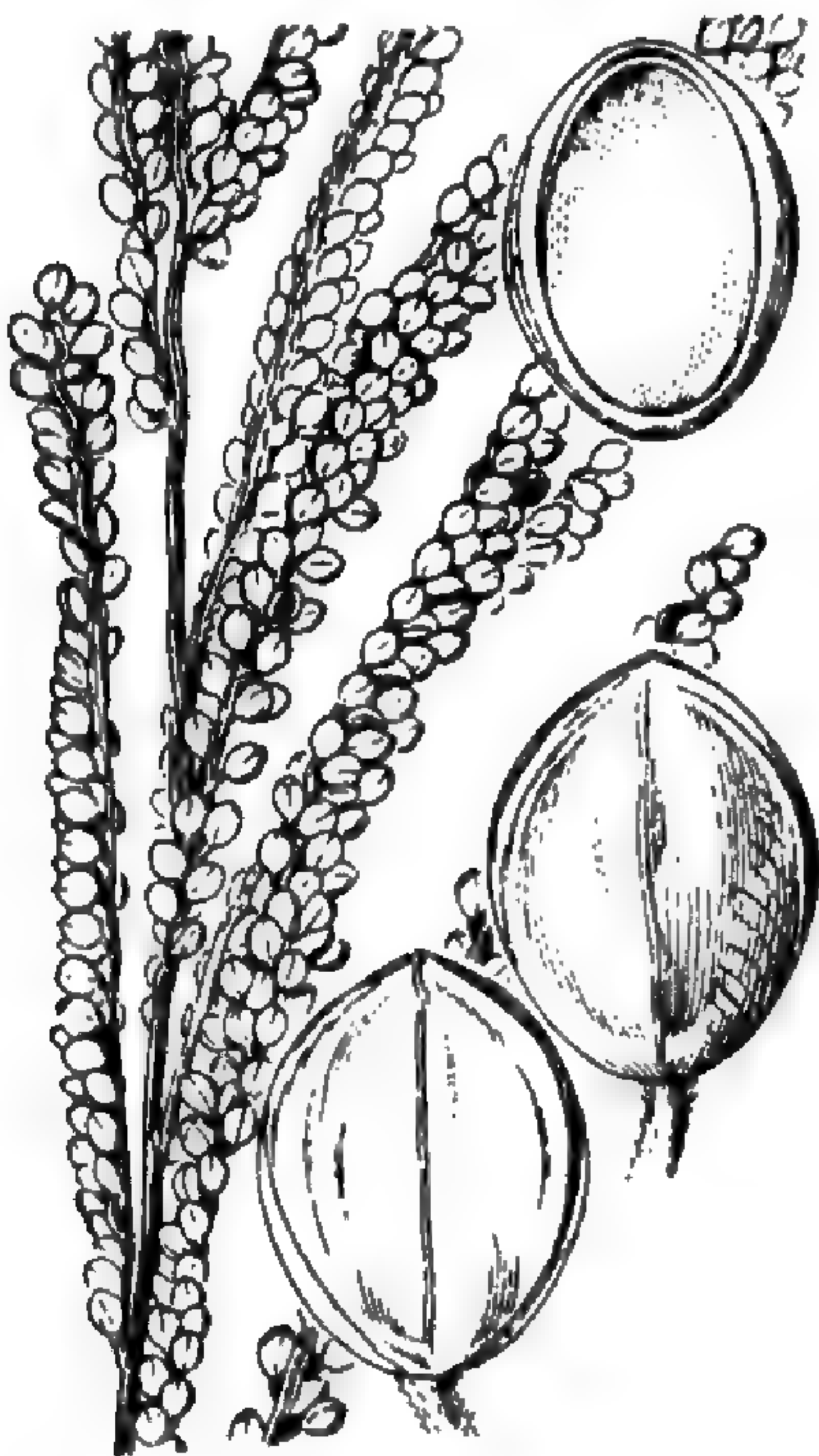


FIGURE 67.—*P. nesiotis*. From type specimen

pale-tawny or faintly tinged with purple; glume and sterile lemma equal, barely or scarcely covering the fruit, 3-nerved; fruit nearly the size of the spikelet, often slightly unsymmetrical, pale, very minutely papillose-roughened.

Type in the U. S. National Herbarium, no. 1060118, collected near the Governor's residence, St. Lucia, Windward Islands, October 18, 1919, by A. S. Hitchcock (no. 16471). In this the primary panicle has fallen, leaving 2 panicle-bearing branches. The only other specimen seen is one collected in Martinique by Père Duss, in 1879, mixed with his no. 548, *Paspalum plicatulum*. This is a much smaller plant with a primary panicle only.

67. *Paspalum squamulatum* Fourn.

Paspalum squamulatum Fourn. Mex. Pl. 2: 11. 1886. "In graminosis prope Chinantla, 1000' (LIEBM. n. 198); Huitamalco, Tinzutlan, * * * (LIEBM. n. 197); Orizaba, * * * (BOURG. n. 2640, BOTT. n. 115)." All the collections cited have

been examined. Bourgeau's no. 2640, in the Paris Herbarium, bearing the name in Fournier's script, is taken as the type. In a previous paper¹³ the first specimen cited, which had been examined in the Copenhagen Herbarium was chosen as the type, but *Bourgeau* 2640, studied in Paris in 1922, better agrees with Fournier's description, the blades being more auriculate. The sheaths are ciliate on the margin and pubescent on the collar; the blades are sparsely ciliate toward the base and some of them have a few hairs on the upper surface. The rachises bear a few scattered hairs. The spikelets are 1.6 to 1.7 mm. long. The other specimens cited agree with this.

Paspalum sumichrasti Fourn. Mex. Pl. 2: 11. 1886. "San Luis de Potosí (VIRL. n. 1301); Orizaba (BOTT. et SUM. n. 115, BOURG. absque n.)." The type, *Botteri & Sumichrast* 115, in the Paris Herbarium, bears the name in Fournier's script. Fournier differentiates this from *P. squamulatum* by blades not auriculate. They are rounded, scarcely auriculate, in the specimens cited as *P. squamulatum*. In *Botteri & Sumichrast* 115, consisting of 4 culms without base, the blades are somewhat narrowed toward the base, or the uppermost rounded. The foliage is nearly glabrous. The spikelets are 1.9 mm. long.

DESCRIPTION

A straggling perennial, the culms few to several in a tuft, decumbent and often rooting at the nodes below, the ends ascending, 25 to 90 cm. long, compressed, glabrous, the lower internodes often vinaceous, leafy throughout, branching at the lower nodes, the branches finally divergent; nodes blackish, glabrous, sheaths shorter than full grown internodes, rather loose, softly ciliate on the margin and usually pubescent on the collar, otherwise glabrous; ligule brown, 3 to 3.5 mm. long; blades flat, spreading, 5 to 15 cm. long, 3 to 15 mm. wide, commonly 7 to 10

¹³ Contr. U. S. Nat. Herb. 17: 234. 1913.

cm. long and 6 to 10 mm. wide, slightly narrowed to a rounded or subauriculate base, ciliate on the margin and commonly with a few hairs on the upper surface and glabrous beneath, sometimes softly and densely pubescent on the upper surface and glabrous or sparsely pubescent beneath, or softly pubescent on both surfaces, the variations found in single individuals; racemes 3 to 13, commonly 5 or 6, 1.5 to 6 cm. long, on a slender angled axis 2.5 to 8 cm. long, ascending to spreading, the lower distant, the upper approximate; rachis slender, angled, scabrous on the margin, and with a few hairs at the base, otherwise glabrous or sometimes with a few scattered hairs; spikelets in pairs on very short slender pedicels, densely crowded, 1.6 to 1.9 mm. long, 1.2 to 1.4 mm. wide, broadly elliptic-obovate, pale green, glabrous; second glume and sterile lemma rather firm, 3-nerved, the glume shorter than the lemma exposing the fruit at maturity; fruit nearly the size and shape of the spikelet, pale, smooth and shining.

This species varies in pubescence as noted above. In *Miller & Griscom* 143 and 144 the spikelets are 1.9 mm. long as in the type of *P. sumichrasti* and most of the blades taper to a narrow base as in that type, but the uppermost blades are rounded at base, one being quite as auriculate as any in *P. squamulatum*. In Hitchcock's no. 6961 the spikelets are 1.9 mm. long, but the blades are not narrowed at base.

DISTRIBUTION

Brushy slopes, pine woods, and partly shaded places in uplands, at 500 to 1,700 meters altitude, Mexico to Costa Rica.

LOWER CALIFORNIA: San José del Cabo, *Brandege* 40.

SINALOA: Culiacán, *Rose, Standley & Russell* 14859.

JALISCO: Zapotlán, *Hitchcock* 7246.

VERA CRUZ: Jalapa, *Hitchcock* 6638, 6654; *Smith* in 1894. Orizaba, *Hitchcock* 6387.

MICHOACÁN: Uruápan, *Hitchcock* 6961, 6978.

OAXACA: Totontepec, *Nelson* 727.

CHIAPAS: Hacienda Monserrate, *Purpus* 9200. Fenia, *Purpus* 443.

GUATEMALA: Cuyatenango, *Rojas* 104. Guatemala City, *Hitchcock* 9055.

NICARAGUA: San Rafael del Norte, *Miller & Griscom* 143, 144.

COSTA RICA: Yerba Buena, *Standley & Valerio* 50012. Cerro de La Carpintera, *Standley* 34211. Cartago, *Tonduz* 2851. La Palma, *Standley* 33187; *Tonduz* 12623. Cerro de Piedra Blanca, *Standley* 32599. San José, *Standley* 33292. Santa María de Dota, *Standley* 41583. San Francisco de Guadalupe, *Jiménez* 160.

68. *Paspalum oligostachyum* Salzm.

Paspalum oligostachyum Salzm.; Steud. Syn. Pl. Glum. 1: 23. 1854. "Salzm. hrbr. Bahia." Steudel's specimen has not been located, but in Salzmänn's own herbarium, in the Institut de Botanique of Montpellier, is a specimen bearing the name in his writing collected by him in "Bahia; in umbrosis," which agrees with Steudel's description, and which is accepted as the type.

Paspalum salzmanni Doell in Mart. Fl. Bras. 2²: 49. 1877. "*Paspalum oligostachyum molle* Salzm. in herbario Bahiensi n. 670; Steudel Syn. 23. n. 93." In



FIGURE 68.—*P. squamulatum*. From type collection

the DeCandolle Herbarium and in the Drake Herbarium in Paris are specimens of Salzmann's 670 with the name in Doell's script. A duplicate is in the United States National Herbarium. Doell's citation of Steudel (p. 23, no. 93) refers to *P. oligostachyum*. Doell states that Salzmann had two species, one *P. oligostachyum molle* (no. 670), the other *P. oligostachyum pilosum* (no. 671), the latter the same as *P. plicatulum* var. *subrotundum* Doell; but why he discarded *P. oligostachyum* Salzm., published by Steudel, is not apparent.

Paspalum oligostachyum molle Salzm.; Doell in Mart. Fl. Bras. 2²: 49, 1877, as synonym of *P. salzmanni*. Specimens collected in "Bahia; in umbrosis," so named by Salzmann, are in the Institut Botanique of Montpellier. They agree with the specimens mentioned above and with the type of *P. oligostachyum*.

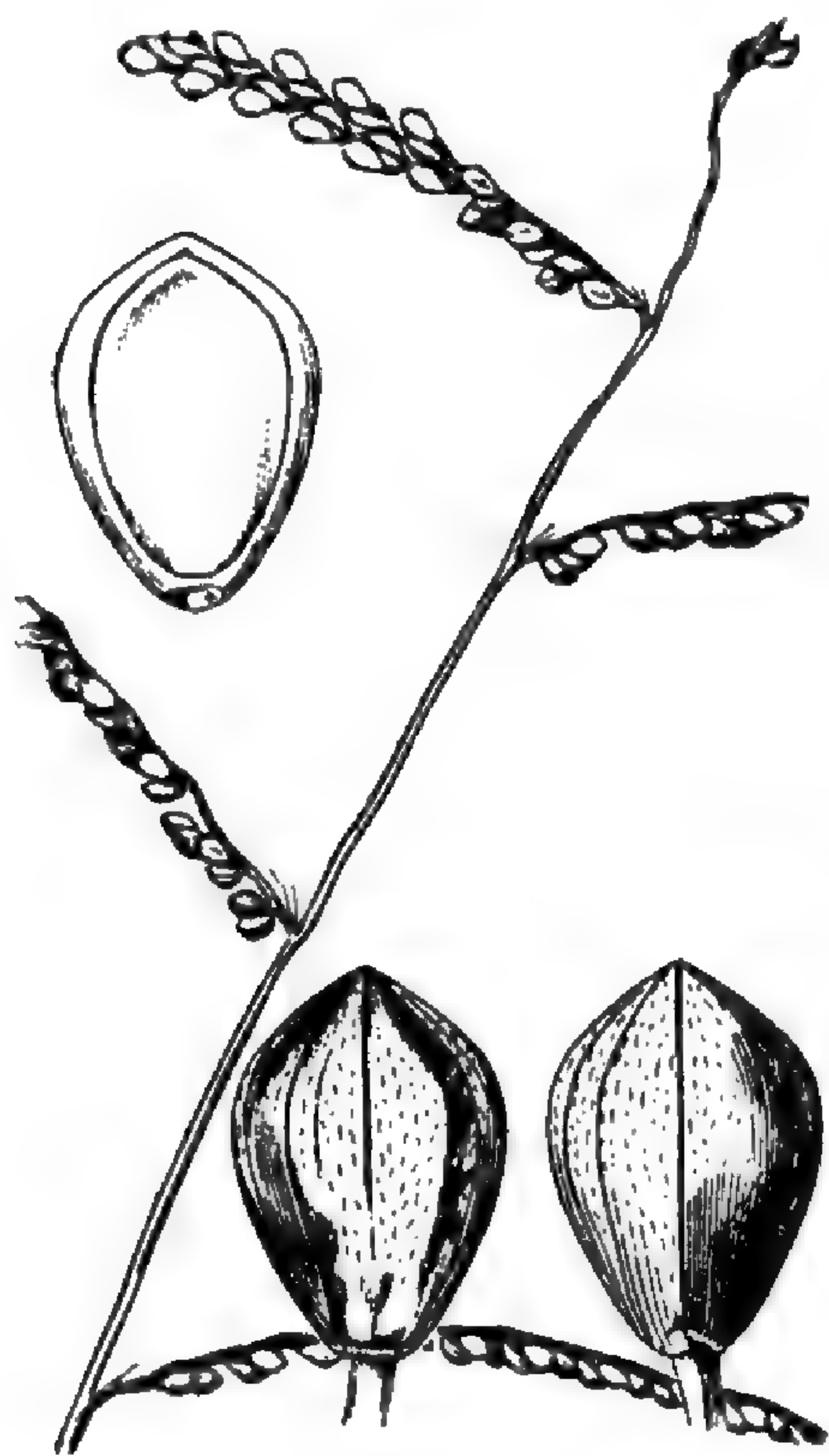


FIGURE 69.—*P. oligostachyum*. From type collection

DESCRIPTION

A leafy olivaceous perennial with dense short erect knotty rhizomes forming a tough clump; culms ascending to spreading, 25 to 75 cm. tall, simple, compressed, glabrous; nodes glabrous; sheaths mostly longer than the internodes, keeled, softly pubescent with spreading hairs, denser and longer at the summit, occasionally glabrescent; ligule about 0.5 mm. long; blades flat, ascending, densely velvety pubescent on both surfaces, and with copious long hairs on the upper surface at base, those of the mid culm 8 to 25 cm., rarely to 30 cm., long, 7 to 13 mm. wide, tapering to a narrow or sometimes slightly rounded base, the upper and lower much smaller; panicles long-exserted, of 2 to 7, commonly 3 to 5, spreading racemes, 3 to 10 cm. long, the common axis 2 to 10 cm. long, slender, angled, glabrous or very minutely puberulent; rachis very slender, flexuous, with a few long white hairs at the base; spikelets in pairs on slender pedicels, loosely imbricate, 2 mm. long, 1.4 mm. wide, subangular-obovate,

bronze-green, mottled with purplish brown; glume and sterile lemma equal, covering the fruit, rather faintly 5 to 7-nerved, obscurely appressed-pubescent with fine hairs; fruit nearly the size of the spikelet, pale, smooth and shining.

DISTRIBUTION

Wooded slopes and clay banks, Trinidad to eastern Brazil.

TRINIDAD: MONOS, *Broadway* 7437.

FRENCH GUIANA: Without locality, *Leprieur* 90.

BRAZIL: Pernambuco, *Chase* 7730; *Pickel* 1346, 1618. Bahia, *Chase* 7859, 7863, 8047½; *Salzmann*.

69. *Paspalum lentiginosum* Presl

Paspalum lentiginosum Presl, Rel. Haenk. 1: 218. 1830. "Mexico." The type specimen, collected by Haenke, in the National Museum at Prague, consists of two plants, one with 4, the other with 5 racemes. The spikelets are 1.9 mm. long.

DESCRIPTION

A leafy glabrous perennial in tufts of few to several erect or ascending culms; culms 75 to 140 cm. tall, sparingly branching, compressed; sheaths mostly overlapping, rather loose, sparsely pilose on the margin at the summit and commonly on the collar, the lowermost, especially on young shoots, papillose-pubescent, slightly auricled; ligule 2 to 4 mm. long; blades flat, or the margins revolute in age, spreading, 12 to 25 cm. long, 8 to 14 mm. wide (the uppermost reduced), rounded at base, with a few long hairs back of the ligule, the margins scabrous; panicle finally long-exserted, of 4 to 17, mostly 5 to 13, spreading to ascending racemes, the lower 3 to 7 cm. long, the others gradually shorter, the common axis 4.5 to 11 cm. long, slender, strongly angled, sometimes with a few hairs on the angles; rachis very slender, with a few long white hairs at the base, mostly naked for 2 to 8 mm. below, the spikelets undeveloped; spikelets in pairs on slender pedicels, loosely imbricate, 1.7 to 1.9 mm. long, 1.4 mm. wide, subhemispheric; glume and sterile lemma equal, covering the fruit, 5-nerved (the lateral nerves obscure), the glume finely papillose-pubescent, the lemma glabrous or nearly so, both speckled with purplish brown, the glume often copiously so, except at the base, the lemma less so and with the margins unspotted; fruit nearly the size of the spikelet, yellowish, smooth and shining.



FIGURE 70.—*P. lentiginosum*. From type specimen and Hitchcock 7098

This species, especially specimens with the more numerous racemes, resembles *P. paniculatum*, but may be distinguished by the nearly glabrous foliage and larger spikelets not crowded in the racemes.

Hitchcock's no. 6874, *Holway* 3514, and *Türckheim* 3773 are large plants with foliage nearly as pubescent as in *P. paniculatum*. The spikelets are 1.7 to 1.8 mm. long and loosely arranged, for which reason the specimens are referred to *P. lentiginosum*.

DISTRIBUTION

Open, mostly moist ground, mainly at low altitudes, western Mexico and Guatemala.

SONORA: Hermosilla, *Hitchcock* 3601, 3621.

SINALOA: Culiacán, *Palmer* 1556 in 1891.

MORELOS: Cuernavaca, *Hitchcock* 6874; *Holway* 3514.

COLIMA: Alzada, *Hitchcock* 7098.

GUATEMALA: Cobán, *Türckheim* 3773. Guatemala City, *Hitchcock* 9094.

70. *Paspalum yucatanum* Chase, sp. nov.

An ascending perennial, leafy toward the base, in small tufts; culms 40 to 60 cm. tall, simple, compressed, glabrous; nodes appressed-pubescent to glabrous; sheaths mostly overlapping, appressed-pubescent except toward the base, the lower sheaths commonly villous; ligule scarcely 0.5 mm. long; blades flat, ascending, 8 to 15 cm. long, 8 to 12 mm. wide, rarely larger, rounded or slightly narrowed at base, usually finely appressed-pubescent on both surfaces and with

long white hairs at the very base, the cartilaginous margin finely undulate, short-ciliate; panicle rather short-exserted, of 4 to 9, rarely 12, spreading to ascending racemes, 3 to 5.5 cm. long, the common axis 5.5 to 12 cm. long, slender, angled, glabrous, with long hairs in the axils and occasionally a few on the angles; rachis slender, the margin scabrous; spikelets in pairs on slender angled pedicels,

rather crowded, 1.3 to 1.4, rarely to 1.5, mm. long, about 1.2 mm. wide, subhemispheric; glume and sterile lemma equal, barely covering the fruit, 5-nerved, or the midnerve of the lemma suppressed, the glume densely covered with spreading gland-tipped hairs, the lemma sparsely so; fruit nearly the size of the spikelet, stramineous, smooth and shining.

Type in the U. S. National Herbarium, no. 951629, collected at Mérida, Yucatán, July 11, 1865, by Arthur Schott (no. 597).

This species approaches *Paspalum blodgettii* of the Caespitosá group, somewhat resembling robust plants of that species with blades shorter and broader than common.

Gaumer's no. 2464 is a larger plant than the other specimens, and has nearly glabrous foliage, the blades 16 to 25 cm. long and 12 to 18 mm. wide; the panicle has 12 racemes with spikelets 1.5 mm. long.

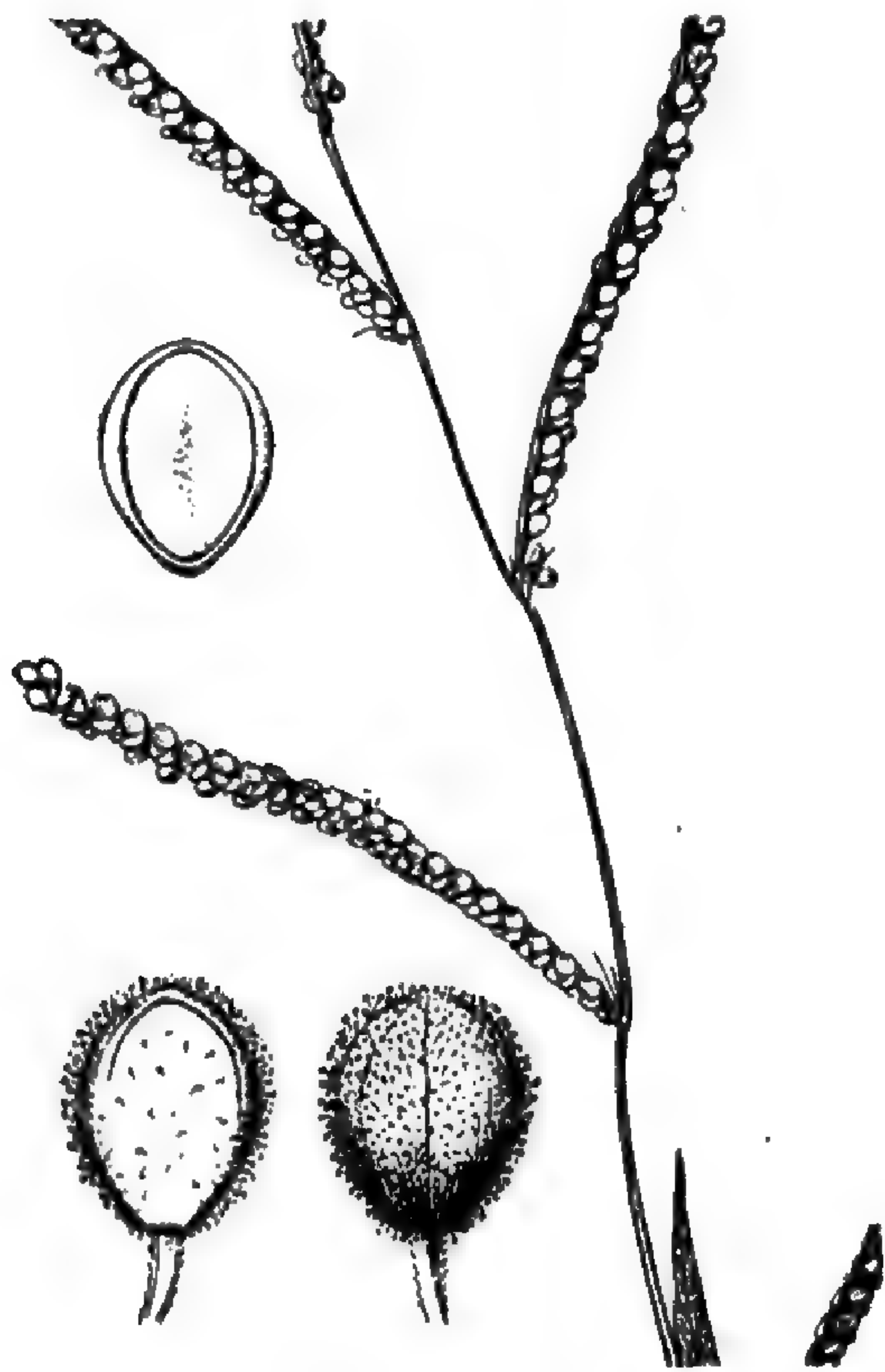


FIGURE 71.—*P. yucatanum*. From type specimen

DISTRIBUTION

Open ground, Yucatán peninsula.

YUCATÁN: Mérida, Schott 597. Izamal, Gaumer 852.

QUINTANA ROO: Chichankanab, Gaumer 2464.

71. *Paspalum paniculatum* L.

Paspalum paniculatum L. Syst. Nat. ed. 10. 2: 855. 1759. No locality is cited. The very brief diagnosis agrees with the type specimen in the Linnaean Herbarium, where it was examined by A. S. Hitchcock. It consists of part of a culm with two leaves and a mature panicle, and was collected by Browne in Jamaica. Following his diagnosis Linnaeus cites "Sloan. jam. t. 72, f. 2." This plate represents *Panicum fasciculatum* Swartz. The Systema Naturae is a very condensed work, but in the following edition of the Species Plantarum¹⁴ Linnaeus says "Habitat in Jamaica" and gives a fuller description. He cites the Sloane phrase name and plate 72, f. 2, as before. But since Linnaeus had a specimen, to which his diagnosis applies while Sloane's does not, Linnaeus' own specimen is taken as the type.¹⁵

Paspalum hemisphericum Poir. Encycl. 5: 31. 1804. "Ledru. * * * de Porto-Ricco. (V. s. in herb. Lam.)" This specimen, with the name in Poiret's script, was examined in the Lamarck Herbarium in Paris. It is the upper part of a plant with a panicle and single leaf.

¹⁴ L. Sp. Pl. ed. 2. 81. 1762.

¹⁵ See Hitchcock, Contr. U. S. Nat. Herb. 12: 116. 1908.

Paspalum strictum Pers. Syn. Pl. 1: 86. 1805. "Hab. in Insul. Antill. et ad St. Domingo." The specimen, in the Paris Herbarium, from Santo Domingo, taken as the type, consists of a panicle and upper sheath only.

Paspalus compressicaulis Raddi, Agrost. Bras. 29. 1823. "Prope Rio-Inhumirim" in the vicinity of Rio de Janeiro, Brazil. The type, in the University of Pisa, is a complete plant with the name in Raddi's script.

Paspalum supinum Rupr.; Galeotti, Bull. Acad. Sci. Brux. 9: 237. 1842. Not *P. supinum* Bosc. A name without description given to Galeotti 5727.

Paspalum multispica Steud. Syn. Pl. Glum. 1: 18. 1854. "*P. guineense* Steud. in Hrbo. Lenormand. Guinea." The type, in the Lenormand Herbarium in the Institut Botanique of Caen, named "*Paspalum guineense* Steud." in Steudel's script, is Jardin's no. 23, "Côte de Guinée, Gabon," Africa.

Paspalum guineense Steud. Syn. Pl. Glum. 1: 18, 1854, as synonym of *P. multispica*.

Paspalum polystachium Salzm.; Steud. Syn. Pl. Glum. 1: 18, 1854, as synonym of *P. multispica*. "Bahia." Salzmann collections so named are in the Montpellier, Delessert, Cambridge University, and United States National Herbaria.

Paspalum affine Bello, Anal. Soc. Españ. Hist. Nat. 12: 125. 1883. Not *P. affine* Steud. 1854. "Porto Rico." The type has not been located. There is no description, the species being differentiated from *P. paniculatum* by the pilose-ciliate base of the blade only.

Paspalum paniculatum β *rigidum* Schlecht.; Fourn. Mex. Pl. 2: 9. 1886. "Absque loco (SCHIEDE); Mirador * * * (LIEBM. n. 164); Tuzpango (BOURG. n. 2379); * * * Cordova (SCHAFFN. n. 283 in hb. Franq.); Oajaca (GHIESBR.)." The Schiede specimen and Bourgeau's no. 2379 were examined in the Paris Herbarium, and Liebmann's 164 in the Copenhagen Herbarium.

Paspalum cordovense Fourn. Mex. Pl. 2: 9. 1886. This name was earlier listed by Hemsley,¹⁶ without description. "In valle Cordovensi (BOURG. n. 2161)." The type, bearing the name in Fournier's script, was examined in the Paris Herbarium. The culm bears roots at a node 20 cm. distant from the base.

Paspalum galmarra F. M. Bailey, Dept. Agr. Brisbane Bot. Bull. 9: 12. 1894. Without description. "Along Harvey's creek, a tributary of the Russell River," Bellenden-Ker Expedition, 1889. Referred by White and by Stapf to *P. paniculatum*.

Paspalum paniculatum var. *minor* Moore, Trans. Linn. Soc. Bot. II. 4: 503. 1895. "Serra da Chapada, prope Santa Anna da Chapada, (n. 134)," Brazil. The type, collected by Spencer Moore, in the British Museum, is only 30 cm. tall.

Panicum paniculatum Kuntze, Rev. Gen. Pl. 3²: 363. 1898. Based on *Paspalum paniculatum* L.

Paspalum paniculatum *minor* Scribn. Field Mus. Bot. 2: 24. 1900. (Published as new without reference to Moore, 1895.) "Near Port Antonio, Jamaica (983), * * * Georgetown, Grand Cayman (1406)." Millspaugh's no. 983, with the name in Scribner's writing, in the United States National Herbarium, is taken as the type. This, lacking the base, is 40 cm. tall.

DESCRIPTION

A coarse leafy perennial in tough clumps with densely hirsute innovations at base; culms suberect or ascending, sometimes decumbent at base and rooting at the lower nodes, 0.3 to 2.15 meters, commonly 0.45 to 1 meter, tall, at first simple, usually branching at about the maturity of the primary panicle, compressed, strongly ridged, glabrous; nodes from conspicuously tawny-bearded with ascending stiff hairs to glabrous, commonly appressed-hispid with short hairs; sheaths

¹⁶ Biol. Centr. Amer. Bot. 3: 477. 1885.

mostly longer than the internodes but often loose and exposing them, keeled, from coarsely papillose-hispid throughout to hispid along the margin and on the collar only, the lowermost densely hispid, loose and orange-brown within; ligule 2 to 3 mm. long; blades flat, or the margins revolute in age, spreading, 9 to 50 cm. long, 6 to 25 mm. wide, commonly 12 to 25 cm. long and 10 to 20 mm. wide, rounded at base or, in long blades, narrowed below, from coarsely hispid on both surfaces and with a long tuft of tawny hairs at the base to scabrous or sometimes glabrous except at base and along the margin, the midnerve prominent beneath; panicle 5 to 30 cm., commonly 8 to 20 cm., long, of several to many (7 to 60) arched-spreading somewhat fascicled racemes, the lower 4 to 12 cm. long, occasionally compound, relatively distant, the upper gradually shorter and



FIGURE 72.—*P. paniculatum*. From type specimen of *P. hemisphericum* and Duss 549

aggregate, the common axis slender but stiff, angled, scabrous; rachis very slender, with long hairs at the base and often with few to several on the margin; spikelets in pairs on slender pedicels, densely crowded, or loosely so in lower racemes, 1.3 to 1.4, rarely 1.5, mm. long, about 1 mm. wide, subhemispheric, the flat face slightly concave, the second glume and sterile lemma equal, barely covering the fruit, 5-nerved, the lateral pair contiguous, the glume loosely pubescent with delicate hairs, the lemma with like pubescence along the margin, sometimes throughout, both blotched or speckled with purplish brown; fruit nearly the size of the spikelet, stramineous, smooth and shining.

This widespread weedy species varies greatly in size and amount of pubescence. Dwarf plants with but 4 or 5 short racemes are found in the mountains or in dry situations. The foliage is rarely nearly glabrous.

DISTRIBUTION¹⁷

Moist open ground and brushy slopes along ditches, and a weed in cultivated and waste places, mostly at low altitudes but reaching 2,100 meters. Mexico and the West Indies to Argentina; also in west Africa, in the Society Islands, and in Queensland, Australia.

SINALOA: Culiacán, *Palmer* 1555 in 1891. Rosario, *Rose* 1543.

NAYARIT (TEPIC): Acaponeta, *Rose, Standley & Russell* 14229. Tepic, *Palmer* 1924 in 1892.

JALISCO: Guadalajara, *Hitchcock* 7316; *Pringle* 2042. Río Blanco, *Palmer* 144 in 1886. San Sebastián, *Mexia* 1830.

VERA CRUZ: Mirador, *Liebmann* 164. Pital, *Liebmann* 163. Córdoba, *Finck* 17½; *Hitchcock* 6397. Orizaba, *Bourgeau* 2642; *Hitchcock* 6346, 6374. Sanborn, *Orcutt* 3246. Coatzacoalcas, *Smith* 1053.

COLIMA: Colima, *Hitchcock* 7036; *Palmer* 18 in 1897, 1265 in 1891.

GUATEMALA: Nentón, *Seler* 2715. Cobán, *Popenoe* 906; *Türckheim* (*Dist. Smith*) 116 (in the herbarium of the Academy of Natural Sciences, Philadelphia, 116 is *P. affine*). Cubilquitz, *Türckheim* (*Dist. Smith*) 7793. Finca Chamá,

¹⁷ In this common species only numbered specimens are cited.

- Popenoe* 894. *Sepacuité*, *Collins & Goll* 06. *Secanquím*, *Goll* 79; *Pittier* 249. *Los Andes*, *Kellerman* 5118. *Morales*, *Kellerman* 6260. *Quiriguá*, *Blake* 7702; *Standley* 23840, 23963, 23978, 24617, 24649. *Cristina*, *Blake* 7627. *Puerto Barrios*, *Deam* 80; *Kellerman* 5761; *Standley* 24789. *San Pablo*, *Salas* 5. *Monte Grande*, *Salas* 6. *Santa Rosa*, *Heyde & Lux (Dist. Smith)* 3558.
- HONDURAS: *Tela*, *Standley* 53748. *Lancetilla Valley*, *Standley* 52831. *San Pedro Sula*, *Thieme* 5594.
- EL SALVADOR: *San Miguel*, *Standley* 21067. *Armenia*, *Standley* 23516. *Santa Emilia*, *Standley* 22077, 22242. *Ateos*, *Standley* 23395. *San Salvador*, *Calderón* 645; *Standley* 20495, 22442, 23090, 23568, 23649; *Velasco* 5. *San Marcos*, *Standley* 22793. *San Martin*, *Standley* 22487. *Santo Domingo*, *Calderón* 1333. *San Vicente*, *Standley* 21716.
- NICARAGUA: *Ameya*, *Maxon* 7143. *Corinto*, *Hitchcock* 8613. *San Juan del Sur*, *Hitchcock* 8594.
- COSTA RICA: *Tilarán*, *Standley & Valerio* 45024, 46554. *Puntarenas*, *Hitchcock* 8559. *La Verbena*, *Standley* 32267; *Tonduz* 8821. *San José*, *Hitchcock* 8468; *Standley* 32876, 33289, 39018; *Tonduz* 6946. *Hacienda de Zent*, *Tonduz* 267. *Siquirres*, *Tonduz* 4197. *La Colombiana Farm*, *Standley* 36702, 37003. *Port Limon*, *Hitchcock* 8416. *Las Cóncevas*, *Lankester* 203.
- PANAMA: *David*, *Hitchcock* 8349. *El Boquete*, *Hitchcock* 8272; *Pittier* 3041. *Bocos del Toro*, *Carleton* 182; *Hart* 65, 88. *Canal Zone*, *Hitchcock* 7907, 8055; *Killip* 4112, 4329; *Macbride & Featherstone* 43; *Piper* 5201, 5203, 5204, 5207, 5208; *Pittier* 3722, 4231, 6767; *Rose* 22075; *Standley* 25462, 25519, 25813, 25997, 26114, 26471, 26966, 27314, 27328, 28354, 28617, 28783, 30062, 31202, 31508, 31529, 40953. *Marroganti*, *Williams* 1034. *Lower Changuinola River*, *Stork* 279. *Panamá*, *Standley* 26820. *Taboga*, *Hitchcock* 8071; *Standley* 27953.
- CUBA: *Guanajay*, *Ekman* 13018. *Sumidero*, *Shafer & Léon* 13539. *San Diego de los Baños*, *Palmer & Riley* 544. *El Guama*, *Palmer & Riley* 179a. *Corrientes Bay*, *Britton & Cowell* 9872. *Guines*, *Léon* 579. *Guayabal*, *Ekman* 685, in *Amer. Gr. Nat. Herb.* 940; *Léon* 933. *Jagüey*, *Eggers* 5317. *Sabana del Guaní*, *Fernando* 430. *Yayabo River*, *Léon* 3978. *Palmarita*, *Léon* 3781. *Eastern Cuba*, *Wright* 766.
- JAMAICA: *Troy*, *Harris* 12610; *Hitchcock* 9790. *Linstead*, *Hitchcock* 9416. *Ipswich*, *Hitchcock* 9602. *Savoy*, *Harris* 11616. *Newcastle*, *Hitchcock* 9334. *Claremont*, *Hitchcock* 9494. *Temple Hall*, *Harris* 11287. *Abbey Green*, *Hitchcock* 9359. *Blue Mountains*, *Harris* 11534, 11561; *Perkins* 1487. *Mt. Hybla*, *Perkins* 1078. *Cinchona*, *Harris* 11278; *Hart* 677, 745. *Content*, *Harris* 11379. *Windsor*, *Maxon & Killip* 268. *St. Margaret's Bay*, *Millspaugh* 1907.
- HAITI: *Plaisance*, *Leonard* 9289. *Marmelade*, *Leonard* 8078, 8080. *Ennery*, *Leonard* 9098. *Port-au-Prince Mountain*, *Cook, Scofield & Doyle* 59. *Gauthier*, *Ekman* H 8129. *Minerve*, *Buch* 1929. *Fond Varettes*, *Leonard* 3626.
- DOMINICAN REPUBLIC: *San Pedro de Macoris*, *Rose, Fitch & Russell* 4169. *Haina*, *Faris* 414. *Sánchez*, *Abbott* 68, 195, 513, 1119. *Without locality*, *Wright, Parry & Brummel* 630.
- PORTO RICO: *Mayaguez*, *Britton* 2368; *Chase* 6154; *Heller* 4399; *Holm* 199. *Maricao*, *Chase* 6239. *Monte Montosa*, *Britton & Cowell* 4149. *Utuado*, *Britton & Cowell* 476, 1013; *Chase* 6459. *Adjuntas*, *Britton & Brown* 5391; *Chase* 6478. *Alta de Piedra*, *Britton & Brown* 6230; 6402. *Coamo Springs*, *Chase* 6553. *Bayamon*, *Chase* 6390. *Rio Piedras*, *Barrett* 73; *Johnston* 375. *Juncos*, *Sintenis* 2509. *Ponce*, *Heller* 6227. *Rio Grande*, *Chase* 6727. *Sierra de Naquabo*, *Britton, Britton & Cowell* 2103.
- VIRGIN ISLANDS: *St. Croix*, *Thompson* 382.
- LEEWARD ISLANDS: *Guadeloupe*, *Duss* 2677; *Hitchcock* 16403. *Dominica*, *Eggers* 795, 1057; *Jones* 35.

- WINDWARD ISLANDS: Martinique, *Duss* 549; *Hitchcock* 16456; "Antilles," *Husnot* 79; *Sieber* 143. Grenada, *Broadway* 131.
- TRINIDAD: St. Ann, *Hitchcock* 10036. Port of Spain, *Hitchcock* 9960, 9993.
- TOBAGO: Adelphi, *Broadway* 4685. Botanic Station, *Broadway* 2996. Spey Side, *Hitchcock* 10249.
- COLOMBIA: Santa Marta, *Smith* 215. Río Frío, *Pittier* 1586. Mesa de los Santos, *Killip & Smith* 15025. Between Piedecuesta and Las Vegas, *Killip & Smith* 15573. Popayan, *Lehmann* 973; *Pennell & Killip* 8120. La Cumbre, *Killip & Hazen* 11127; *Pennell* 5021; *Pennell & Killip* 5950.
- VENEZUELA: Mene Grande, *Pittier* 10622. Tovar, *Fendler* 1714; *Pittier* 9301. Petare, *Pittier* 7720. Pico de Naiguatá, *Pittier* 6223.
- BRITISH GUIANA: Bartica, *Hitchcock* 17190. Wismar, *Hitchcock* 17460.
- BRAZIL: Pará, *Goeldi* 21, 310. Pernambuco, *Pickel* 1619. Bahia, *Chase* 7868. Caparaó, *Chase* 9632. Viçosa, *Bailey* 1162, 1169, 1189; *Chase* 9504. Serra do Cipó, *Chase* 9263. Lagoa Santa, *Chase* 8984. Barbacena, *Chase* 8650. Juiz de Fóra, *Chase* 8519, 8600, 8612. Lavras, *Chase* 8735. Franklin Sampaio, *Dorsett* 265b. Caldas, *Mosén* 4569; *Regnell* III. 1341. Serra de Itatiaia, *Chase* 8348; *Sampaio* 4098. Campos, *Sampaio* 2794. Therezopolis, *Bailey* 1228. Rio de Janeiro, *Chase* 8240; *Dusén* 130; *Glaziov* 17353. Nova Friburgo, *Holway* 1464. Campos do Jordão, *Chase* 9864; *Holway* 1776, 1781, 1793. Rio Claro, *Löfgren* 503. Poá, *Holway* 1731. São João, *Holway* 1650. Lapa, *Holway* 1675½. Villa Augusta, *Holway* 1597. Arthur Anfim, *Holway* 1630. Riberao Pires, *Holway* 1679. Cantareira, *Holway* 1568. Tremembe, *Holway* 1612. São Manoel de Botocatin, *Gerdes* 64. Goyaz, *Gardner* 3501. Chapada, *Malme* 2395. Serrinha, *Dusén* 13625. Blumenau, *Ule* 973. Silveira Martins, *Lindman* A 1347.
- PARAGUAY: Río Apa, *Hassler* 11649. Sierra de Amambay, *Hassler* 10134, 10738. Central Paraguay, *Morong* 553.
- ECUADOR: Milagro, *Hitchcock* 20180. "Reg. subtrop.," *Sodi* 299.
- PERU: Colonia Perené, *Hitchcock* 22072. La Merced, *Hitchcock* 22132. "Andes," *Pöppig* 957.
- BOLIVIA: Mapiri, *Rusby* 198; *Buchtien* 1164, 33 in 1926. Hacienda Simaco, *Buchtien* 5323. Coroico, *Buchtien* 6435; *Hitchcock* 22722. Hacienda Anacuri, *Holway* 726. Milluhuaya, *Buchtien* 4196, 4269. Sirupaya, *Buchtien* 415. La Florida, *Holway* 680; *Hitchcock* 22624, 22627. Antahuacana, *Buchtien* 6436. Yungas, *Bang* 308.
- ARGENTINA: San Ignacio, *Ekman* 573.
- AFRICA: Kamerun, Bipinde, *Zenker* 4026. Island of San Thomé, *Macquerrys* 17; *Moller* 130. Island of Mauritius, *Vaughan* A6.
- SOCIETY ISLANDS: Tahiti, *Setchell & Parks* 50, 370. "Society Islands," *Moore* 237.
- AUSTRALIA: Yungaburra, *White* in 1918.

Caespitosa.—Perennial; culms tufted, simple or occasionally with a single branch, its leaf sometimes hidden in the parent sheath, its inflorescence appearing to be axillary; racemes few to several; spikelets mostly elliptic.

Spikelets about 1.3 mm. long, glandular-pubescent.....72. **P. blodgettii.**
Spikelets 1.5 mm. long or longer.

Primary pedicel nearly as long as its spikelet, the spikelets not crowded.

Spikelets about 1.7 mm. long; blades glabrous on the lower surface.

74. **P. molle.**

Spikelets 2 to 2.1 mm. long; blades appressed-pubescent on the lower

surface.....75. **P. umbratile.**

Primary pedicel much shorter than its spikelet, the spikelets crowded.

Nodes or some of them appressed-pilose; spikelets green or purplish.

Ligule obsolete or minute.....73. *P. caespitosum*.

Ligule 1.5 to 2 mm. long76. *P. acutifolium*.

Nodes glabrous; spikelets pale, stramineous or brownish.

Spikelets 1.7 to 2 mm. long; racemes slender, arcuate----78. *P. laxum*.

Spikelets 2.1 to 2.5 mm. long; racemes rigid.

Blades 2 to 15 cm. long, rarely longer; spikelets 2.1 mm. long.

77. *P. bakeri*.

Blades 12 to 55 cm. long; spikelets 2.2 to 2.5 mm. long.

79. *P. pleostachyum*.

72. *Paspalum blodgettii* Chapm.

Paspalum dissectum Swartz; Roem. & Schult. Syst. Veg. 2: 308, 1817, as synonym of *P. caespitosum* Flügge, with reference to a note by Swartz¹⁸ on a form of *P. filiforme* found in fertile soil bearing 3 or 4 racemes which, he says, agrees with the diagnosis of *P. dissectum* [L. undoubtedly intended] except as to prostrate habit, linear blades and in other ways. In the Swartz Herbarium in Stockholm is a specimen of *P. blodgettii*, collected by Swartz in Jamaica and named *Paspalum dissectum*. Flügge¹⁹ refers *P. dissectum* as used by Swartz to *P. caespitosum* Flügge.

Paspalum blodgettii Chapm. Fl. South. U. S. 571. 1860. "Key West, Dr. Blodgett." The type has not been located. The brief description points to a small specimen of the species later described as *P. simpsoni*. "Spikelets minute ($\frac{1}{8}$ " long) * * * minutely pubescent and granular" applies better to *P. simpsoni*, with glandular-pubescent spikelets about 1.3 mm. long, than to *P. caespitosum*, to which Chapman later²⁰ referred it, with spikelets 1.5 to 1.8 mm. long, not at all glandular. Chapman probably did not distinguish the two forms, *P. caespitosum* not being in the earlier editions. The only collection by Blodgett at Key West that has been seen is the type of *P. gracillimum* (see below).

Paspalum simpsoni Nash, Bull. Torrey Club 24: 39. 1897. "Collected by J. H. Simpson on No Name Key, Florida, in May, 1891, no. 184." The type was examined in the herbarium of the New York Botanical Garden. A duplicate is in the United States National Herbarium. In these specimens the glandular tips of the hairs on the spikelets are particularly prominent.

Paspalum gracillimum Nash in Small, Fl. Southeast. U. S. 73, 1326. 1903. "Type, Key West, Blodgett, in Herb. C. U." This specimen was examined in the herbarium of Columbia University. It consists of the upper part of two culms and an additional panicle. The specimen is marked in Vasey's hand "*Paspalum caespitosum* Flügge, *P. Blodgettii* Chapm."

DESCRIPTION

A caespitose perennial with tough base, the innovations and culm bases commonly somewhat swollen and bulblike, the scales densely pubescent; culms erect, slender, compressed, glabrous, commonly 40 cm. to 1 meter tall, simple or occasionally with a single axillary inflorescence; nodes dark, constricted, glabrous or obscurely pubescent; lower leaves crowded, the upper two distant, their sheaths elongate; sheaths keeled toward the summit and often with a minute auricle, the lower pubescent, especially at the summit, the upper pubescent toward the summit or nearly glabrous throughout; ligule minute with a ring of

¹⁸ Fl. Ind. Occ. 1: 137. 1797.

¹⁹ Monogr. Pasp. 209. 1810.

²⁰ Fl. South. U. S. ed. 3. 578. 1897.

hairs back of it; blades flat, ascending, or the lower spreading, 5 to 25 cm. long, 3 to 14 mm., commonly 5 to 10 mm., wide, rounded at the base or the lower narrowed, sparsely papillose-ciliate toward the base, rarely nearly throughout, otherwise glabrous or occasionally obscurely pubescent on either surface; racemes 2 to 12, commonly 3 to 8, slender, remote, or the upper approximate, arcuate-spreading, 2 to 8 cm. long, the common axis slender but stiff; rachis narrow, scarcely flexuous, with a few long hairs at the base, otherwise glabrous; spikelets in pairs, on slender pedicels, crowded, tinged with brown or purple, 1.3 to 1.4 mm. long, about 0.9 mm. wide, obovate, blunt, strongly plano-convex; glume and sterile lemma equal, barely covering the fruit, 3 to 5-nerved, the glume pubescent

with gland-tipped hairs, the sterile lemma glabrous or sometimes pubescent; fruit very blunt, smooth and shining.

The blades of this species vary from elongate and narrow to relatively short and broad (8 to 10 cm. long and 8 to 10 mm. wide). The specimens with elongate foliage are probably parts of crowded large tufts. Exceptionally short specimens with short spreading blades somewhat resemble *Paspalum longepedunculatum*, but the smaller spikelets, with glandular pubescence, and the more numerous racemes distinguish it.

DISTRIBUTION

Open or brushy calcareous soil; southern Florida, Honduras, Bahamas, and the Greater Antilles.

FIGURE 73.—*P. blodgettii*. From type collection of *P. simpsoni*

FLORIDA: Miami, *Chase* 3840, 3861; *Garber* in 1877; *Hitchcock* 626, 2462; *Tracy* 9056; *Westgate* 3122. Homestead, *Hitchcock* 689; *Weatherwax* 834. Royal Palm Hammock, *Small & Small* 5429. Hattie Bauer Hammock, *Small, Mosier & Small* 6477. Cocoanut Grove, *Hitchcock* 2502; *Small & Carter* 611. Ross Hammock, *Small, Mosier & Small* 6485. Cutler, *Eaton* 246. Black Point Creek, *Small, Mosier & Small* 6740. Long Key, *Small & Carter* 2870. Paradise Key, *Mosier* 178. No Name Key, *Curtiss* 5440; *Pollard, Collins & Morris* 124; *Simpson* 184. Key West, *Curtiss* in 1884; *Hitchcock* 607.

HONDURAS: Copán, *Pittier* 1847.

BAHAMAS: Nassau, *Curtiss* 165; *Hitchcock* in 1890.

CUBA: Madruga, *Léon* 6354. Batabanó, *Ekman* 12604; *Hitchcock* 470. Motembo *Léon* 8628. Sabana de San Marcos, *Léon* 9182. Baraguá, *Hitchcock* 23346. Santiago de Cuba, *Léon* 954. Jauco, *Léon* 11690, 11719. Isle of Pines, *Britton, Britton & Wilson* 15359; *Britton, Wilson & Léon* 15790; *Millspaugh* 1408. Eastern Cuba, *Wright* 3443 in part.

JAMAICA: Montego Bay, *Hitchcock* 9668. Savanna-la-Mar, *Hitchcock* 9874. Troy, *Harris* 12620; *Hitchcock* 9816. Ipswich, *Hitchcock* 9599½, 9624; *Maxon & Killip* 1519. Black River, *Harris* 12546. New Forest, *Hitchcock* 9833. Between Ewarton and Linstead, *Hitchcock* 9417, 9464. Bog Walk, *Harris* 12560. Between Bog Walk and Spanish Town, *Amer. Gr. Nat. Herb.* 571. Claremont, *Hitchcock* 9476, 9480. Buff Bay, *Hitchcock* 9766. Stony Hill, *Harris* 12703. Mt. Diablo, *Maxon & Killip* 459; *Ridley* 3. Kingston, *Hitchcock* 9470.

HAITI: Aux Cayes, *Ekman* H 42.

PORTO RICO: Joyuda, *Britton, Stevens & Hess* 2398. Aguadilla, *Chase* 6579, 6580, 6605.

73. *Paspalum caespitosum* Flügge

Paspalus caespitosus Flügge, Monogr. Pasp. 161. 1810. "Insula Hispaniola. Poiteau et Turpin.—Essequebo. Domina van de Moer. (Herbar. Mertens.) Specimen mecum communicaverunt Poiteau et Willdenow." In the British Museum is a specimen named "*Paspalus caespitosus*" with reference to Flügge's work, and labeled "Sto. Domingo. Poiteau, 1803." This has flat blades and 4 racemes, and is very characteristic of *P. caespitosum* as commonly understood. Another which appears to be of the same collection is in the Paris Herbarium. In the Trinius Herbarium is a specimen labeled "*Paspalum caespitosum* Fl. ab ipso cel. auctor acceptam comm. Cl. Mertens.," which is doubtless part of the Essequebo collection cited by Flügge. It is *P. molle* Poir. and does not agree with Flügge's description as well as does the Poiteau plant.

Paspalum gracile Poir. in Lam. Encycl. Suppl. 4: 313. 1816. Not *P. gracile* Rudge, 1805. "Cette plante croît a Saint-Domingue. (V. s. in herb. Desfont.)" The type, with the name in Poiret's script, was examined in the Florence Herbarium. A better specimen of the same collection is in the Richard Herbarium at Paris. Both are characteristic specimens of *P. caespitosum*, the foliage involute, as frequently found in dry ground specimens.

Paspalum heterophyllum Desv.; Poir. in Lam. Encycl. Suppl. 4: 315. 1816. "Cette plante croît à Saint-Domingue (V. s. in herb. Desv.)." The type was examined in the Florence Herbarium. The plant is without the base, the culm with 5 racemes. Desvaux²¹ gives Poiret as author of *P. heterophyllum* and states that the name ought to be changed because there was inadvertently a second species with different leaves mixed with the specimen. This he had named *P. parviflorum*, but that name was preoccupied, hence he renames it *P. lanceaefolium*. In the Florence Herbarium is a specimen without inflorescence labeled *Paspalum* "*lanceaefolium* Desv. in Ham. prod. *heterophyllum* Poiret. enc. supp." Attached to the plant is a partly illegible ticket; "St. Domingi," "*P. caespitosum*," and "*heterophylla*" were all I could make out. The plant is probably *Sporobolus indicus* (L.) R. Br.; it is not a species of *Paspalum*.

Paspalum poiretii Roem. & Schult. Syst. Veg. 2: 878. 1817. Based on *P. gracile* Poir., the name presumably changed because of *P. gracile* Rudge, 1805.

Paspalum lineare Fourn. Mex. Pl. 2: 12. 1886. Not *P. lineare* Trin. 1826. "Absque loco (LIEBM. n. 192); Chinantla (LIEBM. n. 187)." The two specimens cited are in the Copenhagen Herbarium, both bearing the name in Fournier's script. Liebmann's no. 192 is the same as *P. langei*; no. 187 is *P. caespitosum*. The description "spicis 5 remotis" applies to the latter specimen, which is therefore taken as the type.

Paspalum caespitosum var. *longifolium* Vasey, Bull. Torrey Club 13: 164. 1886. No specimen or locality is cited, and there is no specimen in the United States National Herbarium so named by Vasey. A collection by Garber from Florida in 1877 with elongate, narrow, nearly glabrous blades, which is named in Vasey's script, "*P. caespitosum* Flügge fide Munro," appears to be the plant described.



FIGURE 74.—*P. caespitosum*. From type specimen and Poiteau, Santo Domingo

DESCRIPTION

A densely cespitose perennial, bluish green, drying paler, the long lower sheaths commonly brownish; culms erect, slender, rather wiry, the base hard and slightly enlarged, compressed, glabrous, 20 to 90 cm., commonly 30 to 60 cm.,

²¹ Opusc. 58. 1831.

tall, simple; nodes appressed-pilose to glabrescent; sheaths narrow, usually pubescent on the collar, otherwise glabrous or the lower sparsely pilose, usually minutely auricled at the summit; ligule obsolete or very minute; blades flat in sheltered situations, commonly more or less folded or involute in exposed situations, rather firm, ascending, 5 to 20 cm., rarely 25 cm. long, 4 to 10 mm. wide, narrowed to the base, usually with a few long hairs on the upper surface and margin at the base, sometimes nearly glabrous or, less frequently, ciliate or pilose on the upper surface or both, to the middle; racemes 2 to 6, commonly 3 to 5, relatively thick, remote, ascending, or somewhat spreading, mostly straight, 1.5 to 6 cm. long, usually not more than 4 cm. long, the common axis slender, angled; rachis narrow, with a few long hairs at base, otherwise glabrous; spikelets in pairs on slender pedicels one-third to half the length of the spikelet, crowded, light green tinged with brown and with dark nerves, 1.5 to 1.8 mm. long, 0.8 to 0.9 mm. wide, elliptic; glume and sterile lemma subequal, the glume barely or scarcely covering the fruit, 3 to 5 nerved, sparsely appressed-pubescent with fine hairs, or, especially the sterile lemma, nearly glabrous; fruit about the size and shape of the spikelet, smooth and shining.

Eaton's nos. 237, 269, and 481, from southern Florida, are rather depauperate plants with racemes solitary or 2, somewhat resembling *Paspalum saugeitii* of Cuba.

DISTRIBUTION

Mostly in partly shaded humus in limestone soil, or rock, sometimes in sandy pinelands; southern Florida, Central America, and the West Indies.

FLORIDA: St. Augustine, *Rugel* 15. Homosassa, *Combs* 922. Tampa Bay, *Simpson* in 1890. Sarasota, *Garber* in 1876. Perico Island, *Tracy* 7032. Longboat Key, *Tracy* 6718. Sneeds Island, *Tracy* 6454. Manatee, *Simpson* in 1890. Palmetto, *Nash* 2445. Palm Beach, *Hitchcock* 2503. Little River, *Eaton* 481. Lemon City, *Tracy* 7192. Miami, *Eaton* 85, 269; *Garber* in 1877; *Hitchcock* 637, 2464; *Tracy* 8851. Royal Palm Hammock, *Peattie* 1903. Cutler, *Eaton* 237. Key Largo, *Chase* 3928; *Curtiss* 3601 and in 1882; *Hitchcock* 2463. Hattie Bauer Hammock, *Small & Mosier* 6460. Goodburn Hammock, *Small & Mosier* 5916. Pumpkin Key, *Small & Mosier* 5677. Big Pine Key, *Small & Mosier* 6059. Sugar Loaf Key, *Pollard, Collins & Morris* 74. Key West, *Curtiss* 3575; *Hitchcock* 607½; *Rugel* 49.

GUATEMALA: Secanquím, *Pittier* 258. Between Los Amates and Izabal, *Blake* 7799, 7815.

BAHAMAS: Andros, *Brace* 5258; *Small & Carter* 8658, 8823. Great Exuma, *Britton & Millspaugh* 3089.

CUBA: Habana, *Ekman* 176; *Léon* 768, 2381, 3701, 7501, 8981. Río Almendares, *Ekman* 331. Columbia, *Léon* 268, 935, 936. Cojimar, *Hitchcock* 464, 465. Tapaste, *Léon* 3676. Tricornia, *Hitchcock* 467; *Tracy* 9087. Batabanó, *Hitchcock* 466. Sagua de Grande, *Léon* 9469. Caya Paloma, *Shafer* 2578. Guaro, *Hitchcock* 23419. Santiago de Cuba, *Léon* 953. Guantánamo, *Britton* 2175; *Ekman* 2890. Jauco, *Léon* 11713, 12314. Isle of Pines, *Britton & Wilson* 14890. Without locality, *Wright* 769, 3443 in part.

JAMAICA: Montego Bay, *Maxon & Killip* 1609. Lititz, *Harris* 12699. Walderston, *Harris* 12758. New Forest, *Amer. Gr. Nat. Herb.* 568. Inverness, *Harris* 12726, 12748. Cane River Valley, *Harris* 11408, 12317. Mt. Diablo, *Maxon & Killip* 504.

HAITI: St. Michel de l'Atalaye, *Leonard* 7186, 7418. St. Marc, *Leonard* 2911, 2915. Morne-à-Cabrits, *Ekman* H 1017. Gonave Island, *Leonard* 5126. Port-au-Prince, *Hitchcock* 19885; *Leonard* 2827. Etang Saumatre, *Leonard* 4216.

DOMINICAN REPUBLIC: Haina, *Faris* 4, 109. Without locality, *Poiteau*.

PORTO RICO: Mona Island, *Britton, Cowell & Hess* 1656, 1839; *Hess* 435, 436. Quebradillas, *Amer. Gr. Nat. Herb.* 569. Penuelas, *Chase* 6489. Vega Baja, *Chase* 6427.

74. *Paspalum molle* Poir.

Paspalum molle Poir. in *Lam. Encycl.* 5: 34. 1804. "À l'île Saint-Thomas * * * recueillie par le citoyen Ledru. (V. s. in herb. Lam.)." The type, in the Lamarek Herbarium, bears the name in Poiret's script. It consists of 2 overmature culms about 30 cm. tall, one with 3, the other with 2 racemes.

Paspalum sciaphilum Steud. *Syn. Pl. Glum.* 1: 18. 1854. "*P. umbrosum*. Salzm. herb. non Trin. Bahia." Salzmann specimens so named by him were examined in the Delessert, Drake, and Kew herbaria. The culms are 22 to 29 cm. tall.

Paspalum umbrosum Salzm.; Steud. *Syn. Pl. Glum.* 1: 18. 1854, as synonym of *P. sciaphilum*.

Paspalum portoricense Nash, *Bull. Torrey Club* 30: 377. 1903. "Type collected between Aibonito and Cayey [Porto Rico,] February 8, 1899, by Heller, no. 524." The type in the herbarium of the New York Botanical Garden consists of 4 small plants, the immature culms 8.5 to 10 cm. tall.

DESCRIPTION

A caespitose perennial forming small tough clumps, mostly olivaceous; culms slender, spreading, 10 to 50 cm. tall, rarely taller, simple, compressed, glabrous; nodes glabrous; leaves mostly somewhat crowded at the base, the sheaths slightly keeled, glabrous or sparsely appressed-pubescent near the margin toward the summit; ligule hyaline, about 0.5 mm. long; blades mostly flat, but involute in exposed situations, thin, ascending to spreading, 3 to 18 cm., mostly 6 to 12 cm., long, 2 to 7 mm. wide, scarcely narrowed to a rounded base, sparsely pilose on the upper surface toward the base, sparingly ciliate on the margins; racemes 1 to 5, commonly 2 or 3, slender, distant, ascending to arcuate-spreading, 1.5 to 7 cm. long, the common axis and rachises very slender, mostly with a few long hairs in the axils; spikelets in pairs on slender pedicels from half as long as the spikelet to about as long, loosely arranged, mostly purple-tinged, about 1.7 mm. long and 0.8 mm. wide, elliptic, subacute; second glume and sterile lemma subequal, covering the fruit or, at maturity, the glume very slightly shorter, 3 to 5 nerved, sparsely appressed-pubescent with very fine hairs, or the sterile lemma glabrous except near the margin; fruit about the size and shape of the spikelet, smooth and shining.

Paspalum molle with its slender loose racemes has a general resemblance to species of *Syntherisma*.

DISTRIBUTION

Open but humid slopes, mostly in red clay, West Indies to Brazil.

BAHAMAS: Crooked Island, *Brace* 4805.

PORTO RICO: Mayaguez, *Chase* 6262, 6322, 6820. Monte Alegrillo, *Amer. Gr. Nat. Herb.* 570. Aguadilla, *Chase* 6607, 6608. Vega Baja, *Chase* 6428. Between Aibonito and Cayey, *Chase* 6338; *Heller* 524. Cayey, *Chase* 6741; *Sintenis* 2451.



FIGURE 75.—*P. molle*. From *Amer. Gr. Nat. Herb.* 570

VENEZUELA: Curucuti, *Pittier* 10218. Carayaca, *Jahn* 301.

BRAZIL: Pernambuco, *Pickel* 1583. Itumerim, *Chase* 7963. Cachoeira, *Chase* 8095. Bahia, *Chase* 7865, 7874, 8050; *Salzmann*.

75. *Paspalum umbratile* Chase, sp. nov.

DESCRIPTION

A slender perennial in small clumps with a knotted base, the young shoots densely villous; culms few to several, ascending to widely spreading, 30 to 55 cm. tall, simple, compressed, glabrous; nodes glabrous; sheaths, except the lower, much shorter than the internodes, keeled, villous on the margin, otherwise gla-

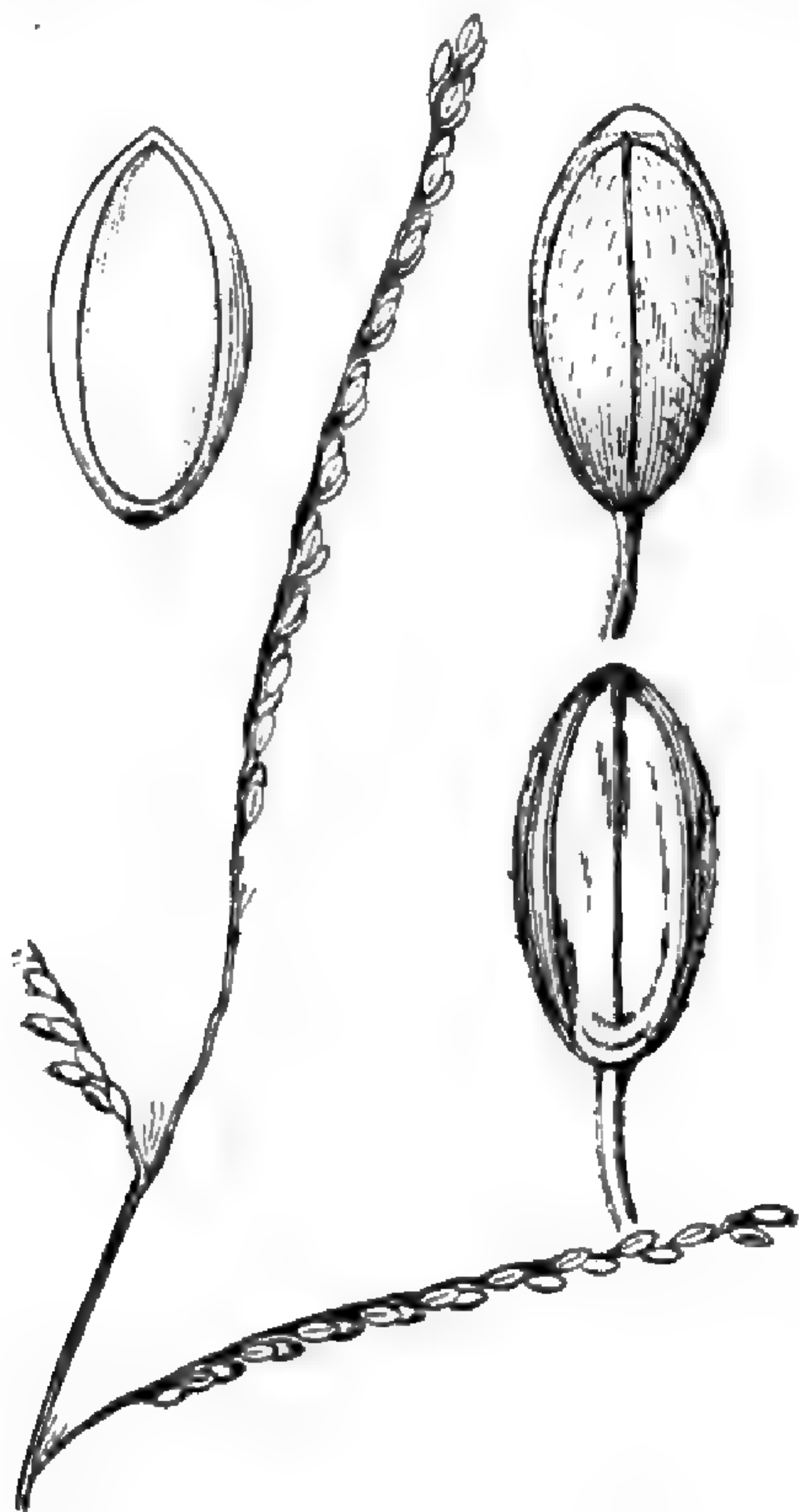


FIGURE 76.—*P. umbratile*. From type specimen

brous, the short lowermost ones villous throughout; ligule about 0.7 mm. long; blades flat, rather firm, ascending, 7 to 15 cm. long, 6 to 10 mm. wide, the lower tapering to a narrow base, the upper rounded, sparsely long-pilose on both surfaces at the base and sparsely appressed-pubescent throughout on the lower surface, the margins irregularly ciliate; racemes 2 or 3, slender, 1 to 1.5 cm. distant on a very slender axis, ascending to spreading, 4 to 6.5 cm. long, the slender rachis naked for 2 to 10 mm. and with a few delicate hairs at the base; spikelets in pairs on slender pedicels, from nearly half as long as the spikelet to about as long, loosely arranged, greenish olivaceous, 2 to 2.1 mm. long, 1 mm. wide, elliptic; second glume and sterile lemma 5-nerved, the glume slightly shorter than the fruit, sparsely appressed-pubescent with fine hairs, the lemma glabrous or obscurely pubescent along the margin; fruit about the size and shape of the spikelet, smooth and shining.

Type in the U. S. National Herbarium, no. 1,406,058, collected on a wet shaded bank, vicinity of Siguatepeque, Department of Comayagua, Honduras, altitude 1,080 to 1,400 meters, February 14–27, 1928, by Paul C. Standley (no. 56212).

The foliage of the type and only specimen seen has evidently been grazed, none of the larger blades being complete. They are probably longer than the measurement given above. This species resembles *Paspalum molle*, but is less delicate; the young basal shoots are densely villous, and the spikelets larger.

76. *Paspalum acutifolium* Léon

Paspalum acutifolium Léon in Britton, Mem. Torrey Club 16: 58. 1920. "Palm barren, sabana de Motembo, Santa Clara (*Léon & Roca* 8164) [Cuba]. The type specimen is preserved in the Colegio de la Salle Herbarium, Vedado, Havana." Specimens of this collection were sent to the United States National Herbarium by Brother Léon.

DESCRIPTION

A caespitose perennial, leafy at the base; culms less slender than in *P. caespitosum*, erect or ascending, simple, geniculate below, 20 to 48 cm. tall, compressed, glabrous; nodes appressed-pilose, the hairs white, 4 to 5 mm. long; sheaths keeled, sparsely papillose-pilose toward the summit and along the margin, the lower short and crowded; ligule 1.5 to 2 mm. long; blades firm, flat from a folded base, sometimes subinvolute toward the tip, ascending, 6 to 17 cm. long (the

uppermost reduced and narrow) 4 to 8 mm. wide, nearly linear, sparsely papillose-pilose on both surfaces or becoming glabrescent; racemes 2 to 4, ascending to arcuate-spreading, 2 to 8 cm. long, the common axis 1 to 3.5 cm. long, flattened; rachis about 0.7 mm. wide, with a few long hairs at the base; spikelets in pairs, imbricate, tinged with brownish purple, about 1.8 mm. long, 0.9 to 1 mm. wide, oblong-elliptic, rather turgid; glume and sterile lemma equal, covering the fruit, 3-nerved, obscurely pubescent near the margin or glabrous, the lemma slightly depressed with raised border; fruit slightly shorter than the spikelet, pale, the palea minutely papillose-striate.

DISTRIBUTION

Sandy or gravelly siliceous soil, palm barrens, and savannas, Cuba.

CUBA: Cauasí, *Léon* 13079, 13119. La Cumbre, *Ekman* 18980. Sabana de Motembo (Placetas del Sur), *Léon & Roca* 8164.

77. *Paspalum bakeri* Hack.

Paspalum bakeri Hack. Inf. Est. Centr. Agron. Cuba 1: 410. 1906. "Prope Habana, leg. C. F. Baker (nr. 1824)." The type was examined in the Hackel Herbarium.

DESCRIPTION

A glabrous perennial forming small tough clumps, leafy at base; culms relatively rather stout, widely spreading, strongly flattened, 20 to 55 cm. long, usually with a single flowering branch from the upper node after the maturity of the primary inflorescence, the branch bearing a leaf, but this commonly reduced and hidden in the sheath of the main culm; nodes glabrous; sheaths strongly keeled with a membranaceous auricle and commonly a few hairs at the summit, the lower short and crowded; ligule about 1 mm. long; blades folded at base, commonly flat above, rather stiffly spreading or ascending, 2 to 15, mostly 2 to 10 cm., rarely to 20 cm., long, 2 to 4 mm. wide, sometimes with a few hairs on the back at base and with a ring of hairs back of the ligule; racemes 2 to 4, stiffly ascending, 2.5 to 7 cm. long, the common axis 1 to 5 cm. long, flattened; rachis flexuous, nearly 1 mm. wide, sparsely pilose at base; spikelets in pairs, mostly loosely arranged toward the ends and somewhat crowded in the middle, pale-stramineous, 2.1 mm. long, 1.1 mm. wide, obovate-elliptic; glume and sterile lemma equal, barely covering the fruit at maturity, 3-nerved, very smooth; fruit nearly the size of the spikelet, smooth and shining.

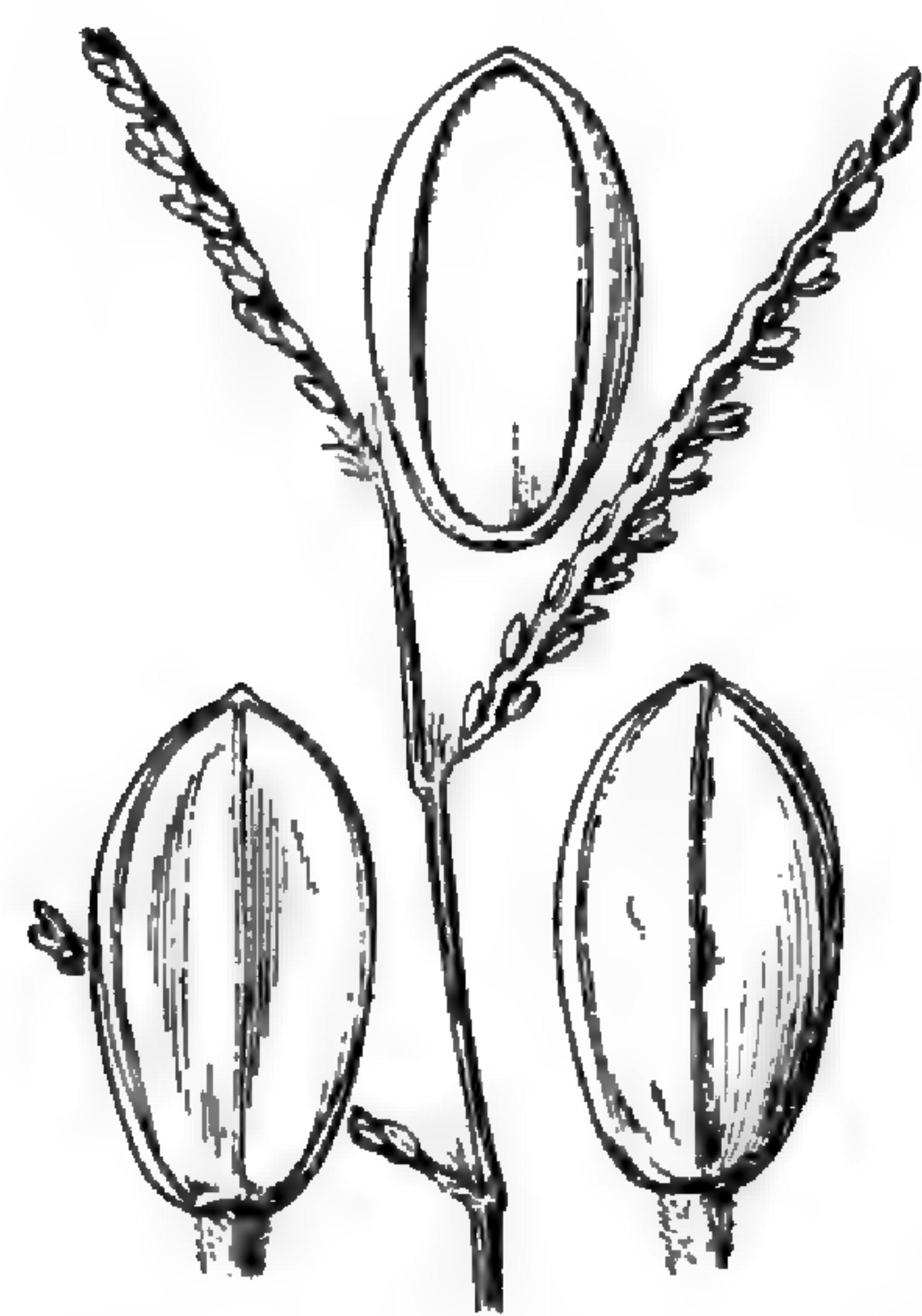


FIGURE 78.—*P. bakeri*. From type specimen

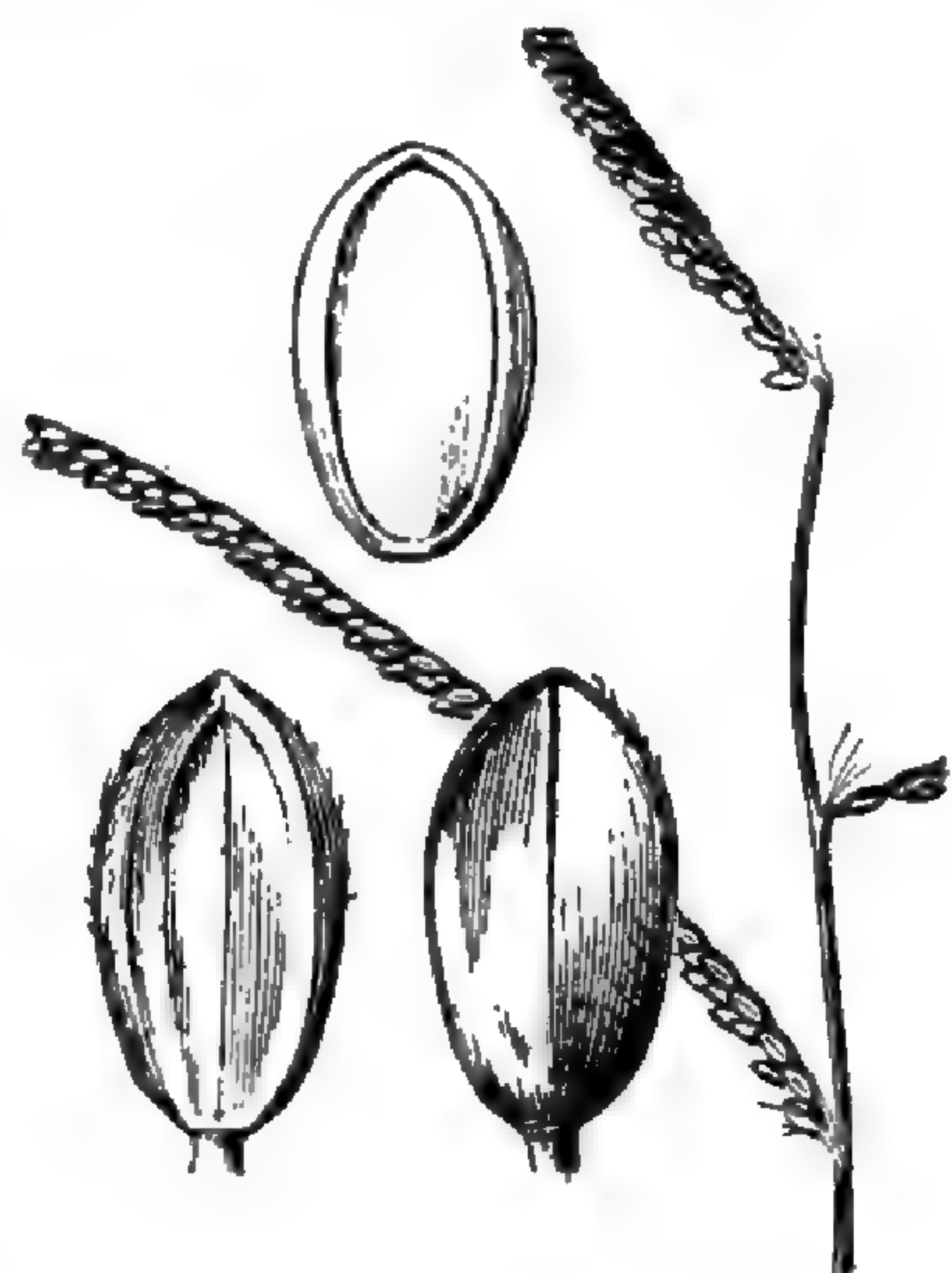


FIGURE 77.—*P. acutifolium*. From duplicate type

DISTRIBUTION

Sandy seashores and coral reefs, Bahamas, western Cuba, and Isle of Pines.

BAHAMAS: Inagua, *Nash & Taylor* 1353.

CUBA: Mariel, *Ekman* 12838, in *Amer. Gr. Nat. Herb.* 942. Habana, *Léon* 956, 2625. Between Morro and Cojimar, *Ekman* 798. Tricornia, *Hitchcock* 475. Yumury Mountains, *Rugel* 869. Matanzas, *Ekman* 17207. Palma Sola, *Wright* 298. Isle of Pines, *Britton, Britton & Wilson* 14939; *Britton, Wilson & Léon* 15294, 15337.

78. *Paspalum laxum* Lam.

Paspalum laxum Lam. Tabl. Encycl. 1: 176. 1791. "Ex America merid. Comm. D. Richard." The type, in the Lamarck Herbarium, bearing the name in Lamarck's script, is without data. In Richard's "Herbarium Guyanensi-Antillarum" in the Paris Herbarium is another specimen, presumably of the same collection. This bears the name and notes in Richard's script and a series of excellent drawings of the spikelet. The label reads "in fruticetis montosi sub-maritimus Sta. Croix." Both plants bear a slender flowering branch and spikelets 1.8 mm. long, the glume very obscurely pubescent. Lamarck adds to his very brief diagnosis the remark "an *P. virgatum* L. excluso sloani synonymo," which indicates that he had an incorrect concept of *P. virgatum*. This remark led to a misconception of his own species. The name *P. laxum* Lam. appeared in various works²² with the original description quoted, but seems not to have been associated with any plant until taken up by Doell²³ for *Paspalum corcovadense* Raddi (*P. plantagineum* Nees). Doell says he saw an authentic specimen of *P. laxum*, but his own description applies to *P. corcovadense* (which has a laxer inflorescence than has *P. laxum*).

Paspalum glabrum Poir. in Lam. Encycl. 5: 30. 1804. "Porto-Ricco * * * apportée par le citoyen Ledru." The type, with the name in Poiret's script, was examined in the Florence Herbarium. The spikelets are 1.8 mm. long, the glume rather densely pubescent, the sterile lemma very obscurely so or glabrous. Specimens of the same collection were examined in the herbaria of Paris, Delessert, and the British Museum. There are no branches in these specimens. The tuft of hairs at the mouth of the sheath is rather scant.

Paspalum milioideum Desv.; Poir. in Lam. Encycl. Suppl. 4: 315. 1816. "Cette plante croît à Porto-Ricco. (V. s. in herb. Desv.)" The type has not been located. The description indicates a rather large plant of *P. laxum* with involute blades.

Paspalum miliare Spreng. Syst. Veg. 1: 247. 1825. Based on *P. milioideum* Desv.

Paspalum ischnocaulon Trin. Gram. Icon. 2: pl. 126. 1828. "Figura ad specimen ex India orientali." In the Corrigenda to the Icones this plate is referred to *Paspalum glabrum* Poir. The type has not been examined, but the description and plate identify the species. "India orientali" is undoubtedly an error for India occidentali.

? *Paspalum sinuosum* Desv. Opusc. 57. 1831. "Habitat in Antillis." The type has not been located. The description applies well to *P. laxum*, but Desvaux adds that the species is related to *P. glabrum* but has much smaller spikelets.

Paspalum floribundum Desv. Opusc. 58. 1831. "Habitat in Antillis?" The type, bearing the name in Desvaux's script, in the Paris Herbarium, is a small immature plant, but 27 cm. tall, the spikelets 1.7 mm. long, nearly glabrous.

Paspalum richardii Steud. Syn. Pl. Glum. 1: 17. 1854. "*P. laxum* Rich. in Hrbo. Mougeot non Lam. Ins. Antillae." The specimen in the Mougeot Herbarium has not been located. As noted above, the specimen in the Paris Herbarium named *P. laxum* by Richard agrees with Lamarck's type. In the Drake Herbarium, however, is a specimen of *P. plicatulum* from Richard's herbarium named "*Paspalum laxum*" in his script. This is labeled, "in arenosis littoralibus Sta Crucis." Steudel's description is very vague but applies better to *P. laxum* Lam. than to *P. plicatulum*.

²² Poir. in Lam. Encycl. 5: 29. 1804; Flügge, Monogr. Pasp. 202. 1810 (among species unknown to the author); Roem. & Schult. Syst. Veg. 2: 315, 1817; Kunth, Enum. Pl. 1: 61, 1833; Steud. Syn. Pl. Glum. 1: 33, 1854.

²³ In Mart. Fl. Bras. 2²: 85. 1877.

Paspalum laxum Rich.; Steud. Syn. Pl. Glum. 1: 17, 1854, as synonym of *P. richardii* Steud.

Paspalum rhizomatosum Steud. Syn. Pl. Glum. 1: 17. 1854. "Duchaissing legit in Guadaloupe." The type, in the Paris Herbarium, bearing the name in Steudel's script, is a tuft of two culms, one a very immature flowering culm, the other sterile. There is no true rhizome.

Paspalum koleopodium Steud. Syn. Pl. Glum. 1: 18. 1854. "Duchaissing legit in Guadaloupe." The type, bearing the name in Steudel's script, in the Paris Herbarium, consists of the upper part of a culm with 1 leaf and 2 peduncles, one with 3, the other with 2, racemes. The spikelets are 1.8 mm. long, the glume obscurely pubescent.

Paspalum laxum var. *lamarckianum* Doell in Mart. Fl. Bras. 2²: 86. 1877. Based on *P. laxum* Lam. itself, but misapplied by Doell to *P. corcovadense* Raddi.

Paspalum helleri Nash, Bull. Torrey Club 30: 376. 1903. "Type collected at Santurce [Porto Rico], Jan. 9, 1899, by Heller, no. 10." The type was examined in the herbarium of the New York Botanical Garden. The specimen is immature. The spikelets are 1.9 to 2 mm. long, the second glume sparsely pubescent.

Paspalum tenacissimum Mez, Bot. Jahrb. Engler 56: Beibl. 125: 10. 1921. "Portorico (Hioram n. 804)." This collection in the United States National Herbarium is a plant 45 cm. tall with long involute blades, the spikelets 1.8 mm. long, the glume rather densely pubescent as in the type of *P. glabrum*. Doctor Mez's specimen has not been located.

DESCRIPTION

A slender perennial in tufts of few to several culms, glabrous as a whole; culms ascending to nearly erect or sometimes, especially in small plants, spreading, simple or with a single flowering branch, 30 to 110 cm., commonly 50 to 75 cm., tall, compressed and rigid; nodes dark; sheaths narrow, ciliate at the obscurely auricled summit and pilose in the throat, sometimes conspicuously so, very smooth, the lower often purple-tinged, sometimes involute toward the summit and slightly diverging from the culm; ligule 1 to 1.5 mm. long; blades commonly more or less involute or flat in rainy seasons or in sheltered situations, firm, usually ascending, mostly elongate, sometimes as much as 50 cm. long, commonly 20 to



FIGURE 79.—*P. laxum*. From Richard's specimen in the Paris Herbarium

30 cm. long, 3 to 8 mm. wide, narrowed to the base, rarely minutely pubescent on the upper surface, the margin scabrous; racemes 2 to 14, commonly 3 to 5, slender, mostly remote (somewhat approximate in panicles of several racemes), usually arcuate-spreading, 3 to 10 cm., rarely to 14 cm., long, the common axis slender, angled; rachis slender, pubescent and usually with a few long hairs at base, the margin scabrous; spikelets in pairs on short pubescent pedicels, imbricate, 1.7 to 2 mm. long, about 1 mm. wide, elliptic-obovate; glume and sterile lemma equal, covering the fruit, 3 to 5 nerved, the glume speckled with brown and obscurely to rather densely pubescent with slightly glandular hairs, the

lemma greenish stramineous, glabrous or very rarely obscurely pubescent; fruit 1.6 to 1.7 mm. long, pale, smooth and shining or sometimes, as in the type of *P. laxum*, under a lens obscurely appressed-pubescent at the tip.

This species is variable in habit. Its most characteristic habitat is coconut groves in sand overlying limestone. In such places, depending apparently on available moisture, the blades may be flat or closely involute, but the plants are commonly tall with ascending to erect culms and elongate blades. In exposed places on the strand or on limestone cliffs the tufts are often short and spreading, with spreading blades 10 to 15 cm. long or less.

The following specimens are very slender plants with narrow firm blades minutely pubescent on the upper surface, 1 or 2 racemes, and spikelets about 1.7 mm. long. They may represent a distinct species but probably are habitat forms, all being from exposed situations: *Britton & Shafer* 1041, 3027; *Ekman* H 4156.

DISTRIBUTION

Sandy and limestone soils, Key West and the West Indies.

FLORIDA: Key West, *Blodgett* (N. Y. Bot. Gard.).

BAHAMAS: New Providence, *Britton & Brace* 404; *Curtiss* 156; *Geogr. Soc. Baltimore* 267. Andros, *Geogr. Soc. Baltimore* 197. Fortune Island, *Hitchcock* in 1890.

CUBA: Between Carabela Grande and Carabela Chica, *Roig* 3204. Habana, *Léon* 3446. Cayo Paloma, *Shafer* 2569. Guaro, *Hitchcock* 23418. Preston, *Ekman* 3475. Santiago de Cuba, *Léon* 951. Guantánamo, *Britton* 1902. Jauco, *Léon* 12305, 12313.

JAMAICA: Montego Bay, *Hitchcock* 9674.

HAITI: Ile de la Tortue, *Ekman* H 4156. Port-de-Paix, *Ekman* H 3593, H 3624. Bayeux, *Ekman* H 2555. Aux Cayes, *Ekman* H 43. Gonave Island, *Ekman* H 8837; *Leonard* 3339. Morne-a-Bateau, *Ekman* H 8043.

DOMINICAN REPUBLIC: Haina, *Faris* 105. Jovero, *Abbott* 2880a. Cape Samaná, *Abbott* 1172. Without locality, *Wright, Parry & Brummel* 607, 617, 618.

PORTO RICO: Mono Island, *Hess* 434. Desecheo, *Hess* 425. Aguadilla, *Chase* 6605½. Aguada, *Chase* 6601. Mayaguez, *Chase* 6182, 6279, 6300, 6313. Joyuda, *Amer. Gr. Nat. Herb.* 572; *Britton, Stevens & Hess* 2395. Boqueron, *Britton, Cowell & Brown* 4636, 4639; *Chase* 6499. Punta Aguila, *Britton, Cowell & Brown* 4686, 4690. Morillos de Cabo Rojo, *Britton, Cowell & Brown* 4717. Quebradillas, *Chase* 6573, 6575. Larcs, *Chase* 6584, 6591. Arecibo, *Chase* 6446. Campo Alegre, *Chase* 6437, 6618, 6625. Maniti, *Chase* 6609. Guanica, *Britton, Cowell & Brown* 4909. Condado, *Britton, Britton & Brown* 6630. Vega Baja, *Chase* 6423. Catano, *Chase* 6635. Santurce, *Chase* 6346; *Heller* 10, 164; *Hioram* 804. Cangrejos, *Stevenson* 2292. Bayamon, *Chase* 6408. Pueblo Viejo, *Chase* 6402; *Hioram* 111, 2717. Rio Piedras, *Chase* 6759. Trujillo Alto, *Chase* 6367, 6369. Cayo Muertos, *Britton, Cowell & Brown* 5041. Salinas, *Chase* 6756. Between Rio Grande and Fajardo, *Britton, Britton & Brown* 7038. Playa de Fajardo, *Chase* 6658. Playa de Humacao, *Eggers* in 1881. Culebra Island, *Britton & Wheeler* 190. Island of Vieques, *Chase* 6678, 6697.

VIRGIN ISLANDS: St. Thomas, *Eggers* in 1876, 1880, 1881, 1882; *Friedrichsthal* 183; *Hitchcock* 16313. St. Croix, *Hitchcock* 16336; *Ricksecker* 410; *Thompson* 449, 463. Angada, *Britton & Fishlock* 986, 1041. Virgin Gorda, *Fishlock* 108. Tortola, *Britton & Shafer* 694, 880. St. Jan, *Britton & Shafer* 257, 292, 506.

LEEWARD ISLANDS: Antigua, *Hitchcock* 16378. Dominica, *Jones* 47.

WINDWARD ISLANDS: Martinique, *Duss* 551. Barbados, *Dash* 584; *Freeman* 5026. Grenada, *Broadway* in 1905.

CURAÇAO: Santa Cruz, *Britton & Shafer* 3027.

79. *Paspalum pleostachyum* Doell

Paspalum pleostachyum Doell in Mart. Fl. Bras. 2²: 58. 1877. "*Paspalus ambiguus* Salzmann n. 665 non Poiret. In collibus apricis prope Bahia (Salzmann, herb. Bahiense [Brazil] n. 665, in herbario Candolleano obvium)." The type, bearing the Salzmann name, was examined in the DeCandolle Herbarium. A duplicate, from Montpellier, is in the United States National Herbarium.

Paspalum ambiguum Salzm.; Doell in Mart. Fl. Bras. 2²: 59, 1877, as synonym of *P. pleostachyum*. "Salzmann n. 665."

Paspalum anemotum Ridley, Journ. Linn. Soc. 27: 68. 1890. "Abundant in open ground behind Fort San Antonio, in the low ground near Tangle Rock and at Morro branco," Fernando Noronha, Brazil. The type, in the British Museum, bearing the name in Ridley's script, was collected by Ridley, Lea, and Ramage, no. 167. It is labeled "Morro branco, Fernando Noronha." The plant is about 90 cm. tall.

Paspalum phonoliticum Ridley, Journ. Linn. Soc. 27: 68. pl. 4. 1890. "On the altered phonolite of Morro branco, growing in clefts of the rock and on the slopes," Fernando Noronha, Brazil. The type, in the British Museum, bearing the name in Ridley's script, is Ridley, Lea, and Ramage's no. 166, and is labeled "on the altered phonolite." This is a larger clump than no. 167, the less mature culms 30 to 40 cm. tall.

DESCRIPTION

A rather rigid perennial, the culms few to many in a tough clump; culms ascending to spreading, simple, or rarely with a single branch, glabrous, or scabrous below the panicle, subcompressed, 40 to 100 cm. tall; nodes dark, glabrous; leaves rather numerous, the sheaths mostly overlapping, densely ciliate on the margin and commonly villous across the collar, conspicuously hairy in the throat, otherwise glabrous or sparsely pilose toward the summit, the lower sheaths often nodulose in drying; ligule about 1 mm. long; blades flat from a folded base, often drying folded or subinvolute, firm, rather stiffly ascending, 12 to 55 cm., commonly 15 to 25 cm., long, 4 to 8 mm. wide, about as wide at the base as the summit of the sheath or slightly narrower, stiffly ciliate on the margin below, usually puberulent on the strongly nerved coarsely cellular upper surface, sometimes pubescent on both surfaces, scabrous on both surfaces toward the apex; racemes 3 to 15, commonly 4 to 8, at length stiffly spreading, 7 to 14 cm. long (the upper one or two often reduced) on a stiff scabrous axis 4 to 11 cm. long; rachis slender, scabrous on the margin, puberulent at the very base and with a few long hairs in the axils; spikelets in pairs on short pubescent pedicels, rather irregularly and loosely crowded, 2.2 to 2.5 mm. long, about 1.2 mm. wide, elliptic-obovate, pale-stramineous; glume and sterile lemma rather firm, glabrous, 3-nerved, or the midnerve of the lemma suppressed, the glume slightly shorter than the lemma; fruit 2.1 mm. long, about 1 mm. wide, elliptic, under a lens minutely papillose-striate.

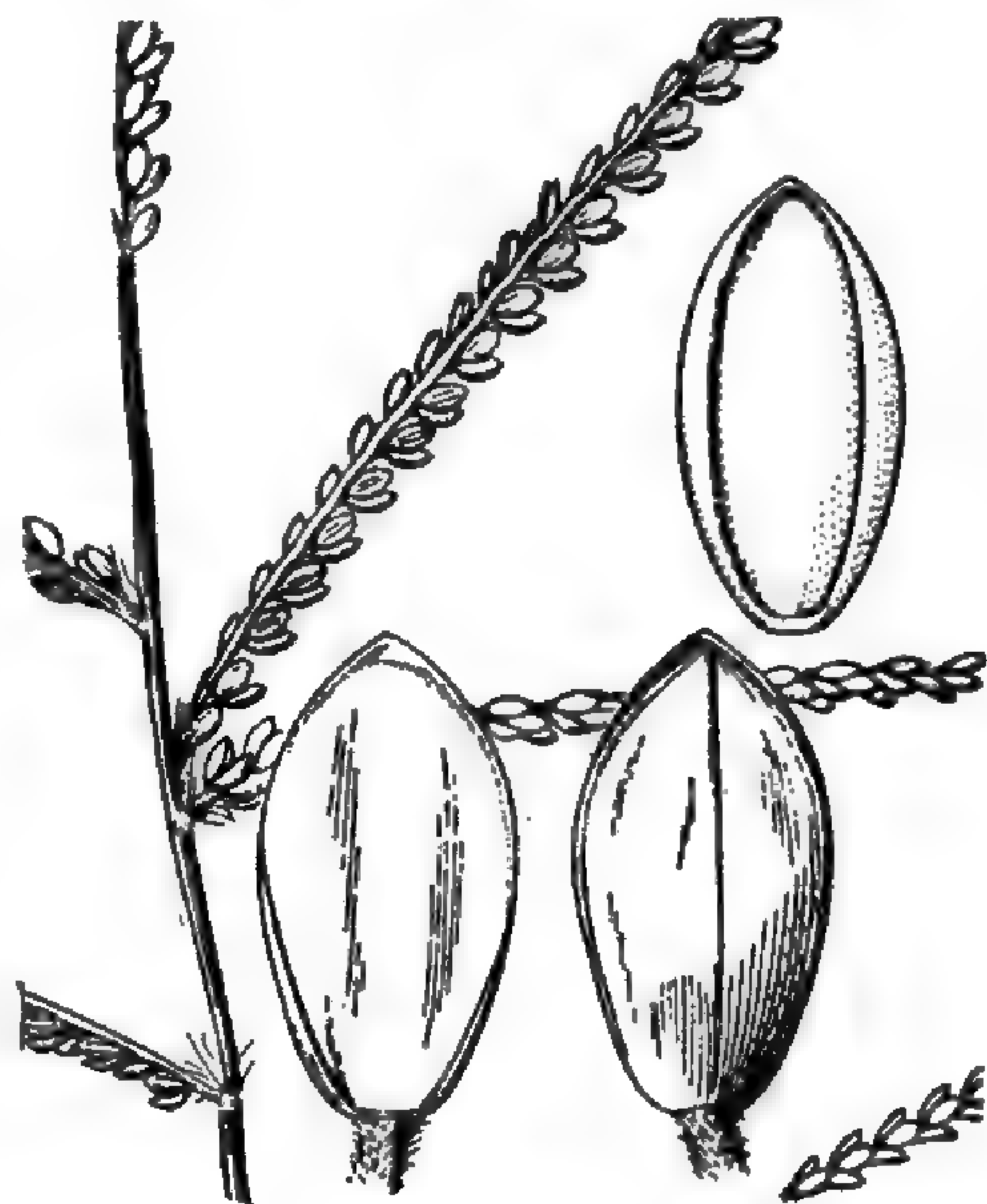


FIGURE 80.—*P. pleostachyum*. From Ekman 15756

This species is variable in the amount of pubescence. In Chase 8045 the foliage is pubescent throughout. In a collection by Broadway, Grenada, in 1905,

the plants are less robust than usual in *Paspalum pleostachyum* and resemble *P. laxum*. The spikelets are 2.3 mm. long.

DISTRIBUTION

On rocks or in sand or clay, seacoast, Cuba to Brazil.

CUBA: Guantánamo, *Ekman* 15756.

HAITI: Ile de la Tortue, *Ekman* H 4132.

WINDWARD ISLANDS: Grenada, *Broadway* in 1905.

BRAZIL: Pernambuco, *Chase* 7656, 7769. Bahia, *Chase* 7903, 8045, 8047; *Salzmann*.

Alterniflora.—Tufted rather wiry perennials, with narrow blades and 1 to few racemes. Confined to the West Indies.

Spikelets glabrous, in pairs.....80. *P. rocanum*.

Spikelets pubescent, solitary.

Blades elongate, glabrous.....81. *P. alterniflorum*.

Blades less than 20 cm. long, conspicuously pilose....82. *P. rottboellioides*.

80. *Paspalum rocanum* Léon

Paspalum rocanum Léon in Britton, Mem. Torrey Club 16: 57. 1920. "Palm barren, sabana de Motembo, Santa Clara (*Léon & Roca* 8233) is the type, preserved in Colegio De La Salle Herbarium, Vedado, Havana." A duplicate type was deposited in the United States National Herbarium by Brother Léon.

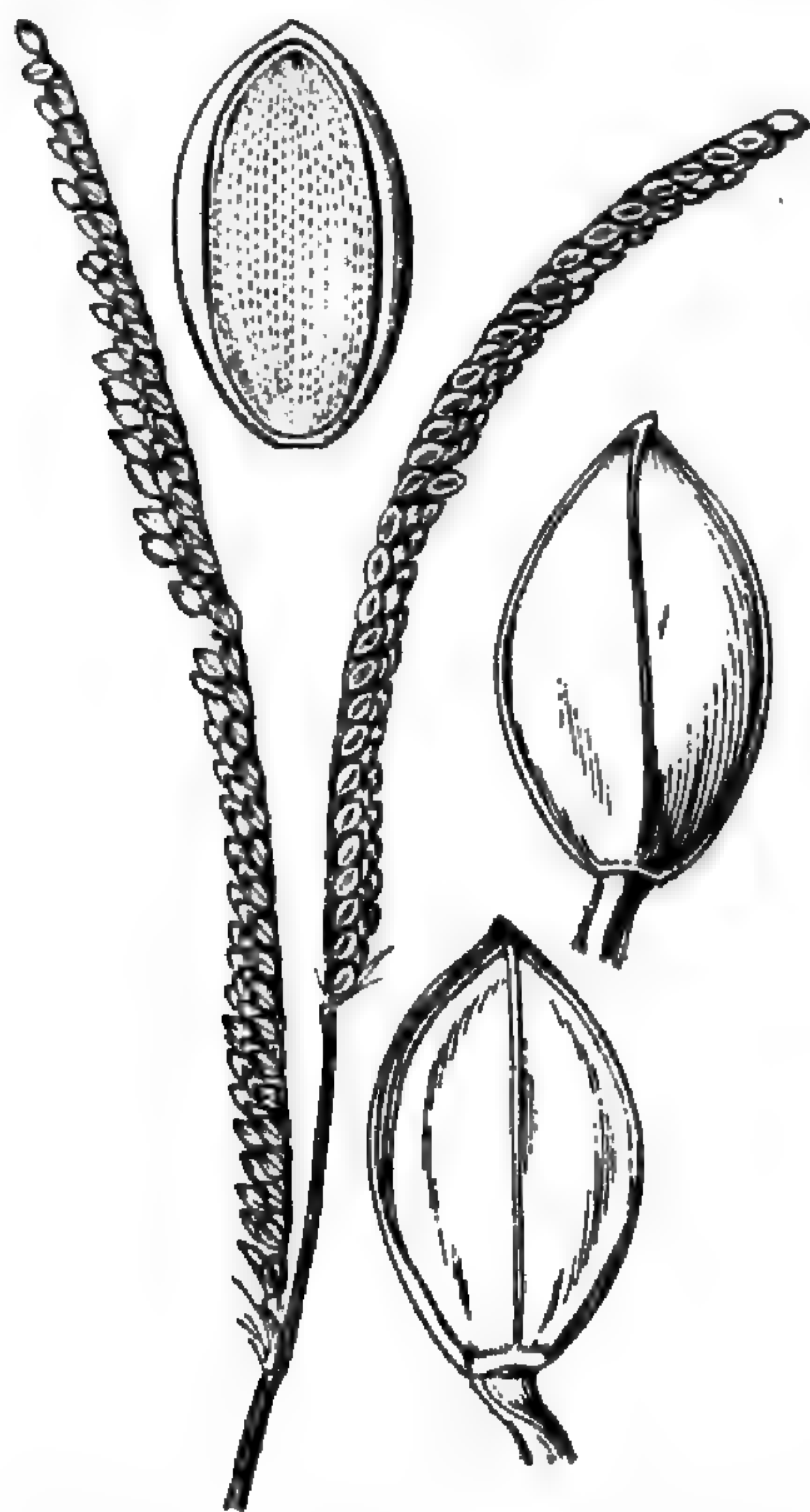


FIGURE 81.—*P. rocanum*. From duplicate type

DESCRIPTION

A slender erect perennial, glabrous as a whole, in small tough clumps with numerous sterile shoots forming a leafy tuft at base; culms simple, 40 to 75 cm. tall, compressed; nodes appressed-pubescent to nearly glabrous; sheaths keeled, sparsely papillose-pilose along the membranaceous margin, the lower and those of the leafy shoots short and overlapping, the upper elongate, their blades reduced or obsolete; ligule 2 to 2.5 mm. long; blades commonly conduplicate, sometimes flat in moist situations or in age, firm, more or less tortuous from an erect base as wide as the summit of the sheath, 10 to 30 cm. long, 3 to 7 mm. wide (flattened out), papillose-ciliate toward the base or glabrous throughout; racemes 2 to 4, from narrowly arcuate-ascending to spreading, 2.5 to 9 cm. long, 1 to 2 cm. distant on a slender common axis; rachis 1.2 to 1.5 mm. wide, scaberulous on the back and with a few long hairs at the base; spikelets in pairs on rather stout pedicels, evenly crowded, 2.1 to 2.5 mm. long, 1.3 to 1.5 mm. wide, depressed plano-

convex, mostly unsymmetrically elliptic, minutely pointed, yellowish green, turning brownish toward maturity, glabrous; glume and sterile lemma subequal, slightly pointed beyond the fruit, 3-nerved, both under a lens sprinkled toward the center with minute golden globular papillae, these drying into minute rusty spots toward maturity; fruit 2 to 2.2 mm. long, pale, minutely papillose-striate.

This species is not closely related to any other known. It seems to be most nearly allied to the Brazilian *P. flaccidum* Nees, with filiform blades and larger spikelets with firmer glume and sterile lemma, the glume smaller, exposing the fruit. *Paspalum rocanum* is placed in *Alterniflora* for convenience.

DISTRIBUTION

Palm barrens, sometimes in moist places, and brush: savannas, Provinces of Santa Clara and Matanzas, Cuba.

CUBA: Sabana de Motembo, *Léon & Roca* 8233; *Léon & Loustalot* 9382, 11337; *Ekman* 16819; *Amer. Gr. Nat. Herb.* 943. Baños de Santa Rosalia, *Léon & Loustalot* 9392. San Miguel de los Baños, Prov. Matanzas, *Léon & Roca* 8871.

81. *Paspalum alterniflorum* A. Rich.

Paspalum alterniflorum A. Rich. in Sagra, *Hist. Cuba* 11: 299. 1850. "Insulae Cubae." The type, collected by Ramon de la Sagra, was examined in the Paris Herbarium.

Paspalum dolichophyllum Hack. *Inf. Est. Centr. Agron. Cuba* 1: 409. 1906. "Prov. de Habana: Calabazar, leg. Baker et Zarragoitia (nr. 4545)." The type, in the Hackel Herbarium with the name in Hackel's script, is labeled "no. 4545 Baker & O'Donovan." The same names are given on a duplicate in the United States National Herbarium. The name of the second collector was doubtless changed by Baker, to whom Professor Hackel must have sent the manuscript. The specimens are overmature.

DESCRIPTION

Plants perennial in large dense clumps, glabrous except as noted; culms 30 to 100 cm. tall, terete, leafy, erect and simple or some of the outer culms of a clump spreading and bearing erect branches from the lower 1 to 4 nodes, the branches like the simple culms; sheaths not keeled, much overlapping, with a tuft of long hairs at the auriculate or truncate summit, or glabrate, the lower sheaths withdrawn from the culm and involute, often purplish; ligule rather firm, 1 to 2 mm. long; blades erect at base, elongate, nearly equaling the culm, mostly 1.5 to 3 mm. wide, involute, or flat but drying involute, puberulent on the upper surface; racemes 1 to 5, commonly 2 or 3, suberect or ascending, 1 to 3 cm. distant on a plano-convex slender common axis; rachis triangular, 1 to 1.5 mm. wide, with a few white hairs at base; spikelets solitary, sessile, appressed, those of a row slightly or scarcely imbricate, 3 mm. long, about 1.2 mm. wide, subcompressed, pale, ovate-oblong, subacute or blunt; glume and sterile lemma much exceeding the fruit, 5-nerved, the lateral pairs of nerves close together, the glume sparsely silky-pubescent especially on the brownish hyaline margin except the upper one-third, the lemma with like pubescence toward the base, sometimes slightly wrinkled below; fruit pale, 1.8 mm. long, 1 mm. wide, obovoid, very minutely striately roughened.

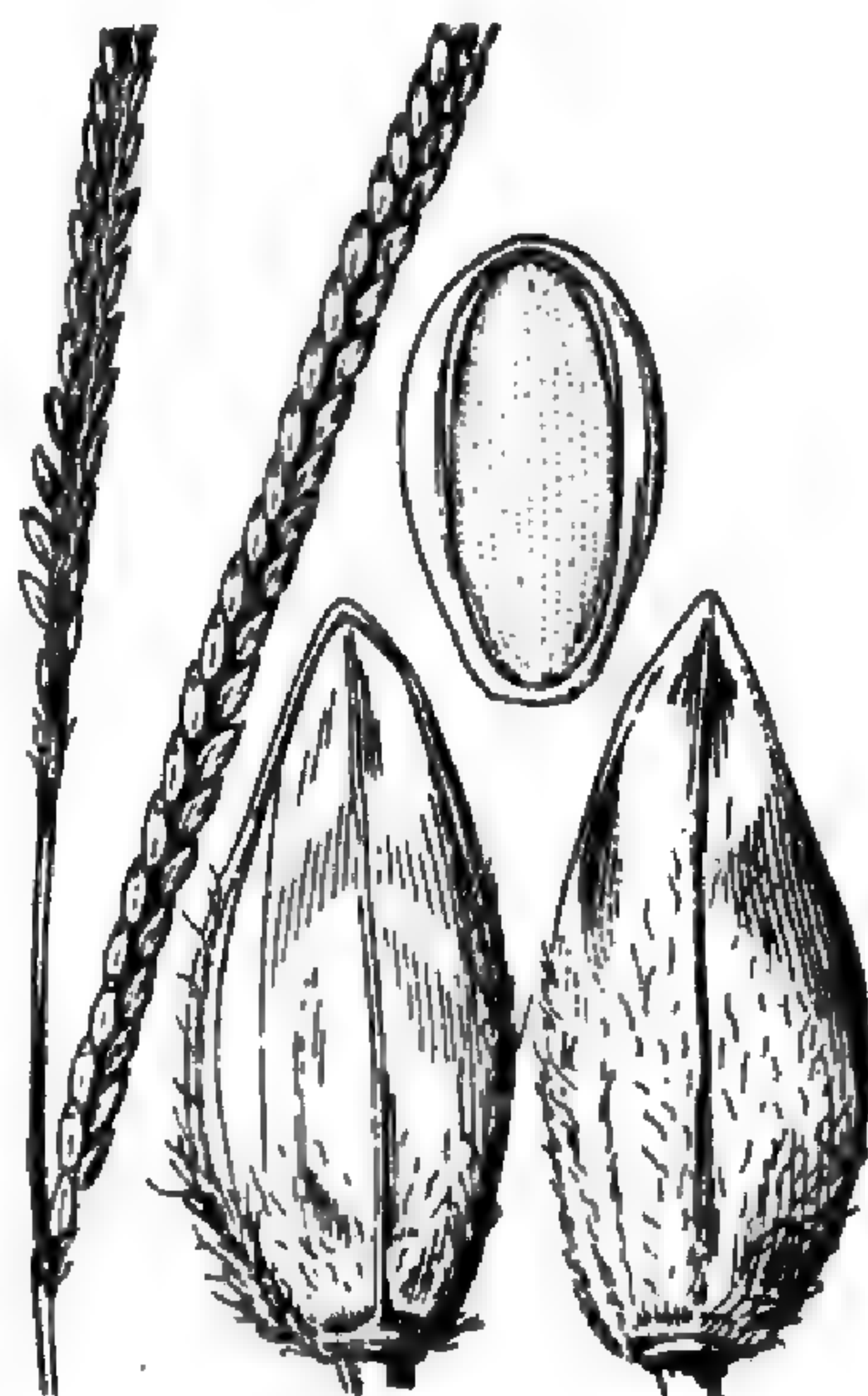


FIGURE 82.—*P. alterniflorum*.
From Baker, Tracy & Hasselbring, Cuba

DISTRIBUTION

Open ground, pastures and savannas, Cuba, common in the western part, rare eastward, and in Haiti. In the Copenhagen Herbarium is a specimen of *Paspalum alterniflorum* bearing a label of Oersted's Central American plants, no. 14109, field no. 91. The species is not known from the continent and the specimen is presumably from the West Indies.

CUBA: Mariel, *Ekman* in *Amer. Gr. Nat. Herb.* 944. Habana, *Baker, Tracy & Hasselbring* in 1907; *Léon* 2556, 3473; *Tracy* 9105. Marianao, *Léon* 581. Arroyo Apolo, *Léon* 564, 585. Vibora, *Baker* 2587; *Léon* 943, 945. Guanabacoa, *Ekman* 594; *Léon* 2561. Calabazar, *Baker & Zarragoitia* 4545. Hanábana, *Wright* 167 in 1865. Caibarien, *Fernando* 36. Manatí, *Léon* 5680. Cupey, *Ekman* 6294. Without locality, *Liebmann* 194, 201; *Rugel* 753a; *Wright* 3841.

HARTI: St. Michel, *Ekman* H 8351; *Nash & Taylor* 1445. Between Anse-à-Veau and Petit Trou des Nippes, *Ekman* H 5401.

82. *Paspalum rottboellioides* Wright

Paspalum rottboellioides Wright, *Anal. Acad. Cienc. Habana* 8: 204. 1871. "[3864] * * * En las sabanas arenosas de la Vuelto-abajo," Cuba, collected by Wright. The type was examined by A. S. Hitchcock in the Gray Herbarium.

Two duplicates are in the United States National Herbarium. These plants are mature, most of the spikelets fallen. The sterile lemmas are glabrous or nearly so.

DESCRIPTION

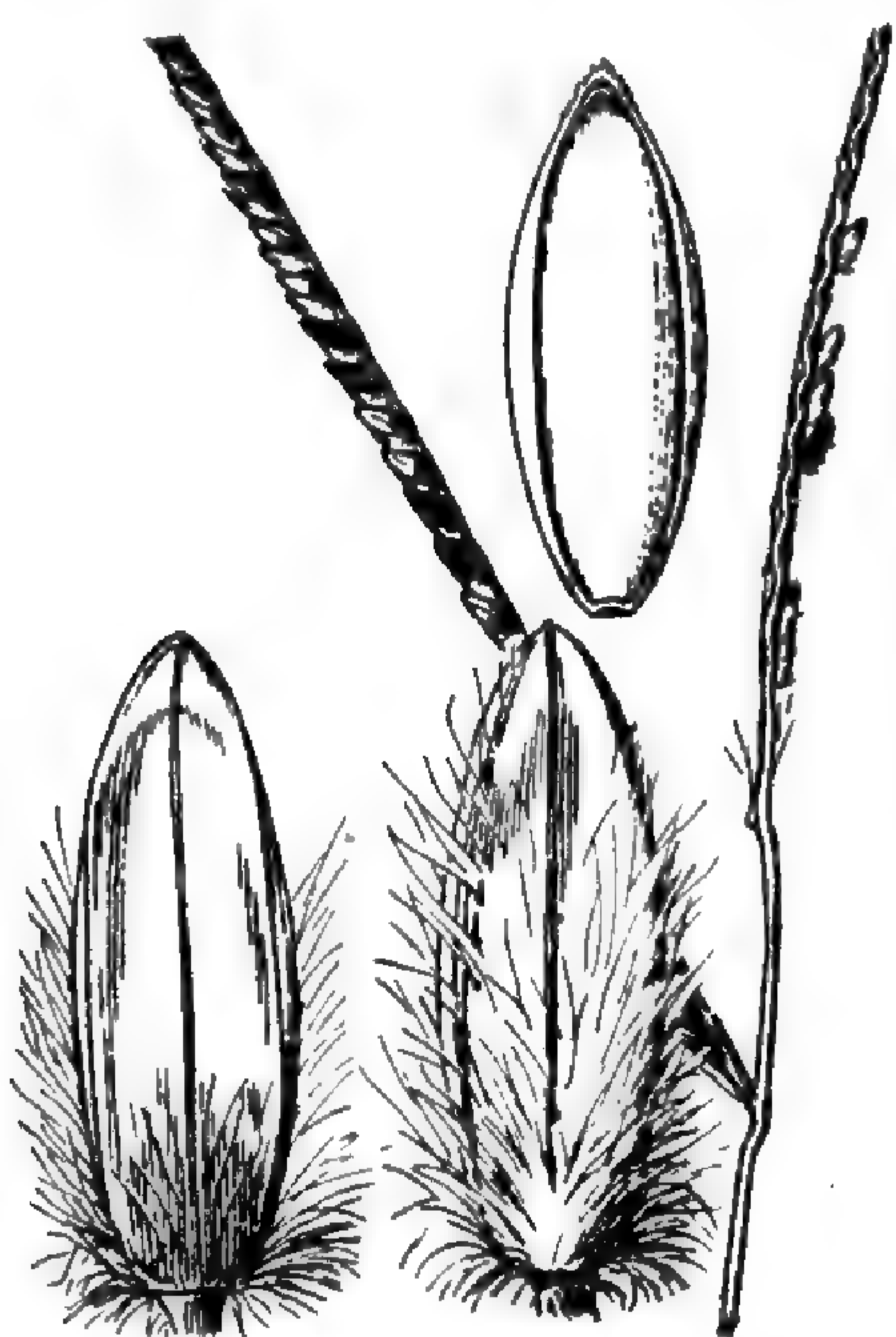


FIGURE 83.—*P. rottboellioides*. From duplicate type

Plants perennial, cespitose, the dense tuft of basal leaves less than half the length of the culms; culms simple, 20 to 75 cm. tall, slender, compressed, yellowish, glabrous, with 2 nodes above the base; nodes glabrous or sparsely appressed-pilose; lower sheaths short, crowded and papillose-pilose, the upper elongate, sparsely pilose toward the summit or glabrate; ligule 0.5 to 1 mm. long; blades spreading, 5 to 18 cm. long (the uppermost reduced), 1 to 1.5 mm. wide, mostly involute, conspicuously papillose-pilose; racemes 1 or 2, ascending or spreading, straight or nearly so, 4 to 12 cm. long, the common axis slender, 1 to 2 cm. long;

rachis 1.5 mm. wide with a thick midrib and narrow membranaceous wings, the margins erose, a few white hairs at the base; spikelets solitary, subsessile, from appressed to rather loose, slightly imbricate, 3 to 3.3 mm. long, about 1 mm. wide, depressed, oblong-elliptic, more or less blotched with dark red or purple, commonly several to many spikelets in a raceme maroon-colored; glume and sterile lemma exceeding the fruit, 5-nerved, the lateral pairs of nerves close together, the glume long-villous except at the summit or throughout, the lemma villous at the base, sometimes glabrous; fruit pale, 2.3 to 2.5 mm. long, about 0.9 mm. wide, elliptic, minutely pubescent at the apex, otherwise smooth and shining.

DISTRIBUTION

Sandy pinelands, and savannas, eastern Cuba and Isle of Pines.

CUBA: Herradura, *Ekman* in *Amer. Gr. Nat. Herb.* 945. Vuelto-abajo, *Wright* 3864. Isle of Pines, *Britton & Wilson* 14697; *Curtiss* 375; *Ekman* 12219; *Taylor* 41.

Filiformia.—Tufted perennials, with slender simple culms, narrow blades and cylindric or subcylindric, usually solitary racemes. (Racemes 1 or 2, rarely to 4 in *Paspalum insulare* and *P. lindenianum*.) Confined to the West Indies.

Foliage conspicuously pubescent, flat or subinvolute.

Racemes rather flat, scarcely cylindric; rachis flexuous.....87. *P. insulare*.

Racemes cylindric; rachis straight.....86. *P. nanum*.

Foliage glabrous or nearly so, concavo-convex in cross section.

Glume and sterile lemma not crumpled.....83. *P. filiforme*.

Glume and sterile lemma inflated and crumpled.

Spikelets 2 mm. long; glume and sterile lemma not pointed beyond the fruit.
84. *P. distortum*.

Spikelets 2.7 to 3 mm. long; glume and sterile lemma pointed beyond the fruit85. *P. lindenianum*.

83. *Paspalum filiforme* Swartz

Paspalum filiforme Swartz, Prodr. Veg. Ind. Occ. 22. 1788. "Jamaica." The type specimen, with the name in Swartz's script, is in the herbarium of the Riksmuseet, Stockholm. A raceme from it was kindly lent for examination, and a duplicate, not labeled in Swartz's script, was deposited in the United States National Herbarium. This is not the species with distorted wrinkled spikelets to which the name has been applied by recent authors,²⁴ but the comparatively rare species described by Nash as *P. leptocaulon*. Grisebach²⁵ does not describe the spikelets as wrinkled, but specimens cited by him and examined in his herbarium show that he included *P. lindenianum* and *P. distortum* in *P. filiforme*. When Doctor Hitchcock visited European herbaria in 1907, the Swartz grasses had been lent to Doctor Mez, then at Halle. The specimen of *P. filiforme* could not be found either at Stockholm or Halle, but it was subsequently returned to Stockholm.

Paspalus swartzianus Flügge, Monogr. Pasp. 96. 1810. Based on "*Paspalum (filiforme)* * * * Swartz. Prodr. p. 22." Flügge, having transferred *Panicum filiforme* L. [*Syntherisma filiforme* (L.) Nash] to *Paspalum*, renamed Swartz's species.

Paspalum lineare Swartz; Steud. Nom. Bot. ed. 2. 2: 272, 1841, as synonym of *P. swartzianum*. Not *P. lineare* Trin. 1826.

Paspalum leptocaulon Nash, N. Amer. Fl. 17: 181. 1912. "Type collected at Lacovia, Jamaica * * * N. L. Britton 1475 (herb. N. Y. Bot. Gard.)." This specimen is a small tuft with three flowering culms.

DESCRIPTION

A very slender glabrous perennial, in large dense tussocks of relatively few flowering culms and numerous leafy shoots, all reclining; culms simple, 20 to 70 cm. long (but flowering culms only 2 to 3 cm. long sometimes found at the base of tall tufts), with but 2 nodes above the base, compressed; sheaths crowded at the base, the lowermost 1 to 2 cm. long, explanate and truncate, the others increasingly longer up to 10 or 12 cm., keeled (the uppermost longer and bladeless or nearly so), ciliate toward the summit; ligule minute; blades mostly 20 to 50 cm. long, the lowermost shorter, about 1 mm. wide, plano-convex, sometimes loosely twisted, ciliate at the base; raceme solitary, arcuate, 3 to 8 cm. long; rachis very slender, plano-convex with a few hairs at base; spikelets solitary, those of a row scarcely

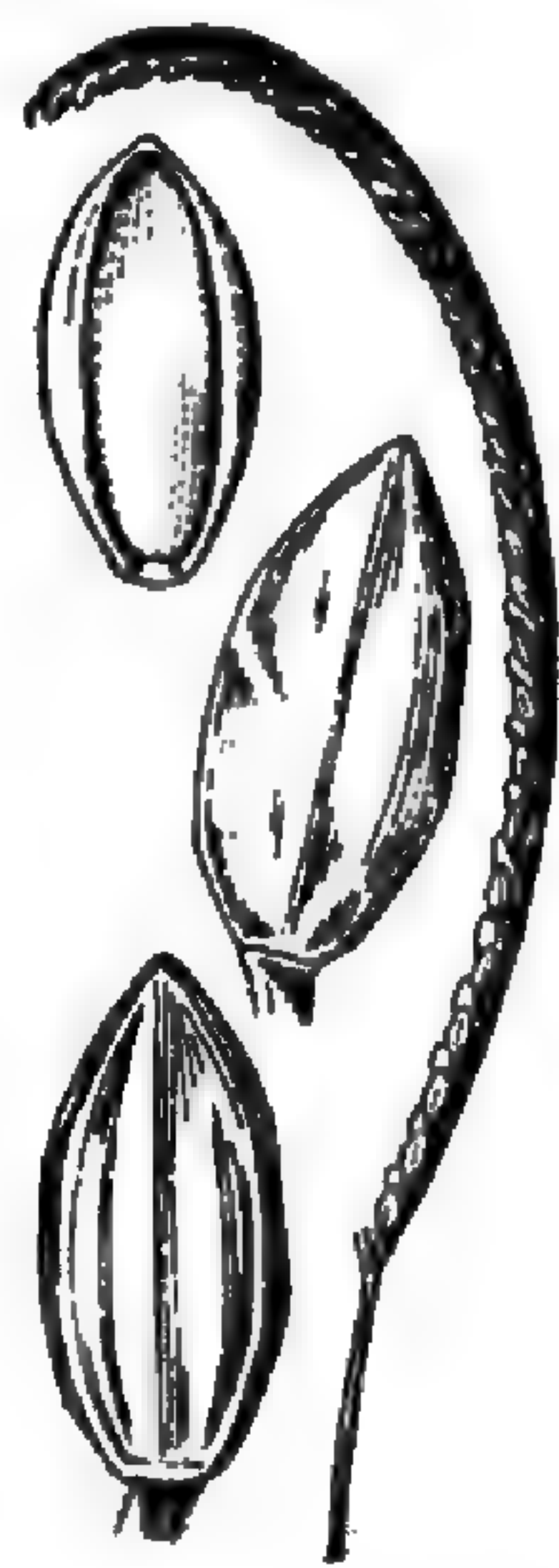


FIGURE 84.—*P. filiforme*. From type specimen

²⁴ Hitchcock, Contr. U. S. Nat. Herb. 12: 202. 1909; Nash, Fl. N. Amer. 17: 180. 1912; Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 312. 1917.

²⁵ Fl. Brit. W. Ind. 542. 1864.

imbricate, subsessile, or the lower on pedicels nearly 1 mm. long, appressed, 1.6 to 1.8 mm. long, 0.7 to 0.8 mm. wide, ovate-elliptic, rather obtuse; glume and sterile lemma firm in texture, 5-nerved, slightly exceeding the fruit, sometimes obscurely angled or wrinkled; fruit pale, 1.4 to 1.5 mm. long, about 0.7 mm. wide, minutely striately roughened.

DISTRIBUTION

Savannas, open or wooded slopes, Cuba, Jamaica, and Hispaniola.

CUBA: Güane, *Ekman* 11095. Remates, *Ekman* 11197. Sabana de Chirigota, *Léon & Roca* 7452. Mariel, *Ekman* in *Amer. Gr. Nat. Herb.* 946. San Miguel de Casanova, *Léon* 12472, 12558. Sabana de Motembo, *Léon & Loustalot* 9346. Manatí, *Léon* 6009. Without locality, *Wright* 3848.

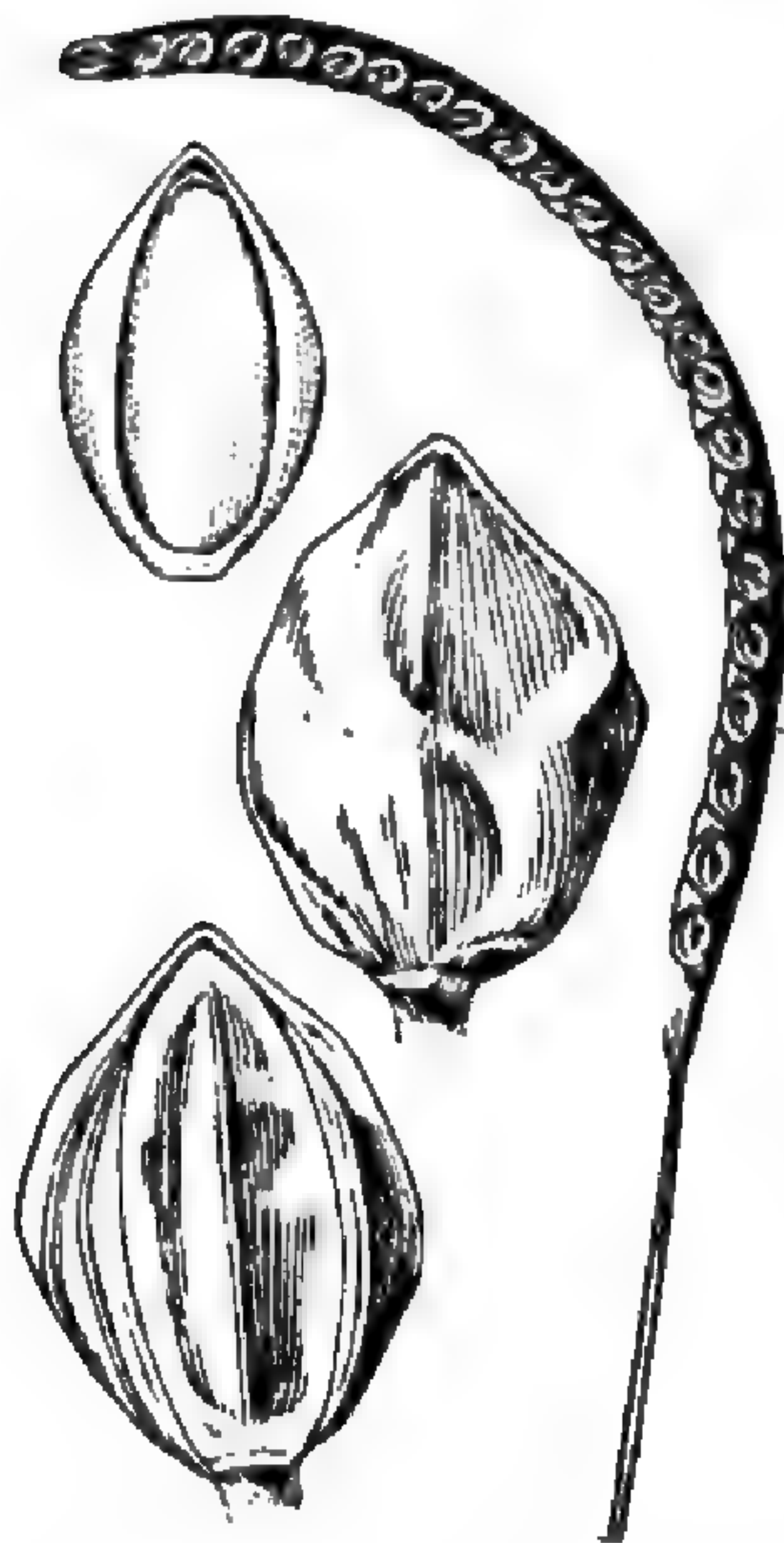
JAMAICA: Savanna-la-Mar, *Hitchcock* 9885. Troy, *Amer. Gr. Nat. Herb.* 566. Lacovia, *Britton* 1475.

HAITI: "Hispaniola," *Swartz*.

84. *Paspalum distortum* Chase, sp. nov.

DESCRIPTION

A glabrous wiry perennial in dense tufts with numerous leafy shoots, suberect to recurved-spreading, the culms and leaves about equal and more or less tortuous, glabrous except as noted; culms simple, with 2 or 3 nodes above the base, 15 to 50 cm. tall, often with short ones intermixed in the tuft, slender, compressed; sheaths crowded at the base, the lowermost short, often explanate or deciduous, showing membranaceous prophylla 1 to 3 cm. long, ciliate at the tapering summit,



the upper increasingly longer, more or less keeled; ligule minute; blades mostly 15 to 40 cm. long, 1 to 1.5 mm. wide, involute or subinvolute, commonly somewhat tortuous, ciliate toward the base; raceme solitary (rarely 2, scarcely 1 cm. apart), arcuate, 2.5 to 6 cm. long; rachis very slender, plano-convex, with a few hairs at base; spikelets solitary, appressed, those of a row not imbricate, 2 mm. long, about 1.7 mm. wide, ovate to somewhat rhomboid, the firm-textured broad inflated glume and the narrower sterile lemma irregularly crumpled, the glume 7-nerved, the sterile lemma 5-nerved; fruit pale yellow, about 1.6 mm. long, 1 mm. wide, minutely striately roughened.

Type in the U. S. National Herbarium, no. 1010224, collected "in dense tussocks, in hillside pasture," Troy, Jamaica, altitude about 600 meters, October 16, 1917, by William Harris (no. 12569).

FIGURE 85.—*P. distortum*.
From type specimen

This species, called wiregrass in Jamaica, is the one referred to as *P. filiforme* Swartz in recent works on Cuba and Jamaica. It is more variable in length of culms and foliage and in width of blade than are true *P. filiforme* and *P. lindenianum*. It is closely allied to *P. lindenianum*, distinguished from it by its usually smaller size, shorter racemes, and smaller spikelets.

DISTRIBUTION

Open hillsides, especially on serpentine rocks, Cuba, Haiti and Jamaica.

CUBA: Cajalbana, *Léon & Charles* 4857. Habana, *Léon* 946. Guanabacoa, *Léon* 7057. San Miguel de Casanova, *Léon* 12473. Sabana del Tibisial, *Léon & Clement* 6661. Manajanabo, *Léon* 5273. Banao Mountains, *Léon & Roca* 8042.

Baraguá, *Walker* in 1925. Sierra Maestra, *Ekman* 14691. El Yunque, *Shafer* 7732. Baracoa, *Ekman* 3597. Isle of Pines, *Curtiss* 374.

JAMAICA: Troy, *Harris* 12564, 12569; *Hitchcock* 9789. Cockpit Country, *Britton* 465. Bull Head Mountain, *Hitchcock* 9544. Claremont, *Hitchcock* 9518. Between Ewarton and Linstead, *Hitchcock* 9438½.

HAITI: Aux Cayes, *Ekman* H 7.

85. *Paspalum lindenianum* A. Rich.

Paspalum lindenianum A. Rich. in Sagra, Hist. Cuba 11: 299. 1850. "Crescit in pratis montosis prope Saltadera, in provincia Santiago de Cuba. (Linden n. 1813.)" The type, labeled "Santiago de Cuba, Linden 1813" is in the Paris Herbarium. It consists of a clump with leaves overtopping the culms and inflorescences of one and of two racemes.

Paspalum longifolium Steud. Syn. Pl. Glum. 1: 21. 1854. Not *P. longifolium* Roxb. 1820. "Linden 1813. Cuba." The type specimen is in the Paris Herbarium, with the name in Steudel's script and the data "Santiago de Cuba, Linden 1813." There is a single inflorescence of two racemes.

Paspalum megaphyllum Steud. Syn. Pl. Glum. 1: 464. 1854. Based on *P. longifolium* Steud.

This species was erroneously included by Doell,²⁶ with the citation of Wright's no. 769 from Cuba, in *P. approximatum* Doell, but his type from Brazil, though it has cross-wrinkled spikelets, is a different species, not known from North America.

DESCRIPTION

A wiry perennial in dense tussocks, the leaves of the numerous sterile shoots usually about equaling the culms, all erect or suberect, 30 to 80 cm., mostly 40 to 70 cm., tall, short culms rarely intermixed, glabrous except as noted; culms with 2 nodes above the base, slender, but relatively stiff, compressed; sheaths crowded below, the lower rather broad and loose, the margins ciliate at the tapering summit; ligule minute; blades mostly 20 to 50 cm. long, about 1 mm. wide, plano-convex or subinvolute, ciliate toward the base; racemes 1 or 2, rarely 3 or 4, arcuate or nearly straight, 3 to 14 cm. long, mostly 6 to 10 cm., the common axis 5 to 20 mm. long; rachis slender, plano-convex, obscurely hairy at the base; spikelets solitary, appressed, those of a row not or scarcely imbricate, 2.5 to 2.8 mm. long, 1.7 to 1.8 mm. wide, irregularly ovate-rhomboid, the firm-textured broad inflated glume and the narrower sterile lemma deeply irregularly crumpled, the glume 7-nerved, the sterile lemma 5-nerved; fruit pale yellow, about 2 mm. long, 1.4 mm. wide, minutely striately roughened.

Linden's no. 1813, the type collection of all the names published for this species, is widely distributed in herbaria. Most of the specimens have inflorescences with two racemes. The one in the Delessert Herbarium has a short culm with a solitary raceme and three tall culms with 2, 3, and 4 racemes, respectively. None of the specimens of Linden's no. 1813 has mature spikelets. Solitary racemes are much more common for the species than are two. The

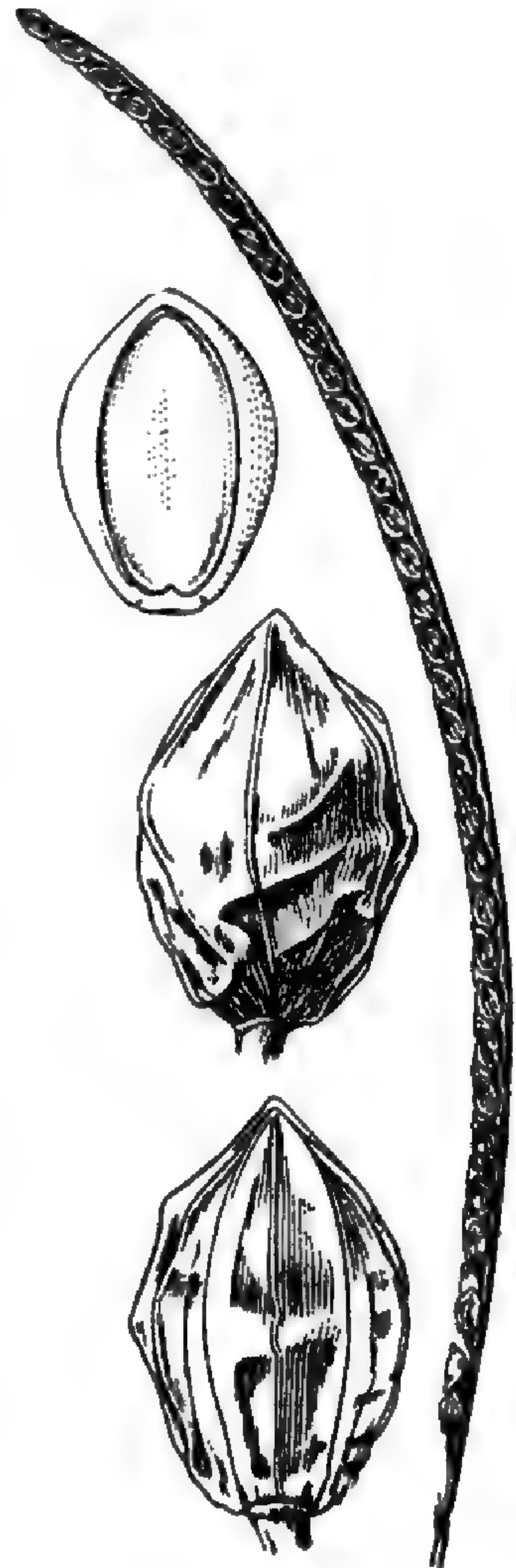


FIGURE 86.—*P. lindenianum*.
From *Hitchcock* 9873

²⁶In Mart. Fl. Bras. 2²: 82. 1877.

first glume is developed in most of the spikelets in *Léon* 7346, and in a few in *Wright* 769, *Curtiss* 523, *Léon* 945b, 5272, *Harris* 12551, and *Hitchcock* 9438.

DISTRIBUTION

Open or brushy places, mostly on limestone hills, Cuba, Jamaica, and Haiti.

CUBA: Mariel, *Ekman* 12908, in *Amer. Gr. Nat. Herb.* 947. Playa de Marianao, *Léon* 5272. Habana, *Léon* in 1909. Guanabacoa, *Ekman* 264; *Hitchcock* 463, 23242; *Léon* 944, 7346. Madruga, *Léon* 3457. Calvario, *Léon* 945b. San Miguel de Casanova, *Léon* 12471. Hanábana, *Wright* 769. Saltadura, *Linden* 1813. Baraguá, *Hitchcock* 23348, 23363. Soledad, *Hitchcock* 23326. Isle of Pines, *Curtiss* 523; *Palmer & Riley* 949.

JAMAICA: Montego Bay, *Hitchcock* 9663. Savanna-la-Mar, *Hitchcock* 9873. Cornwall, *Harris* 12551. Between Ewarton and Linstead, *Hitchcock* 9438.

Between Bog Walk and Spanish Town, *Hitchcock* 9294. Lucea, *Harris* 12559.

HAITI: Marmelade, *Leonard* 8434. Mirabalais, *Cook, Scofield & Doyle* 87.

Pétionville, *Leonard* 4830. Between Décayette and Dupréné, *Ekman* H 2045.

86. *Paspalum nanum* Wright

Paspalum nanum Wright; Griseb. Cat. Pl. Cuba 230. 1866. "Cuba occ., in savanis pr. Hanábana (Wr. a 1865)." The type, Wright's no. 176, "Bushy savannas, Hanábana, June 1," 1865, was examined by A. S. Hitchcock in the Grisebach Herbarium. The culms are 8.5, 13, 15, and 22 cm. tall, much exceeding the leaves.

Paspalum caudicatum Wright, Anal. Acad. Cienc. Habana 8: 205. 1871. "[3866] En sabanas arenosas de la Vuelta-abajo." The type is in the Gray Herbarium and a duplicate in the United States National Herbarium. In this collection the culms are mostly shorter than the leaves.

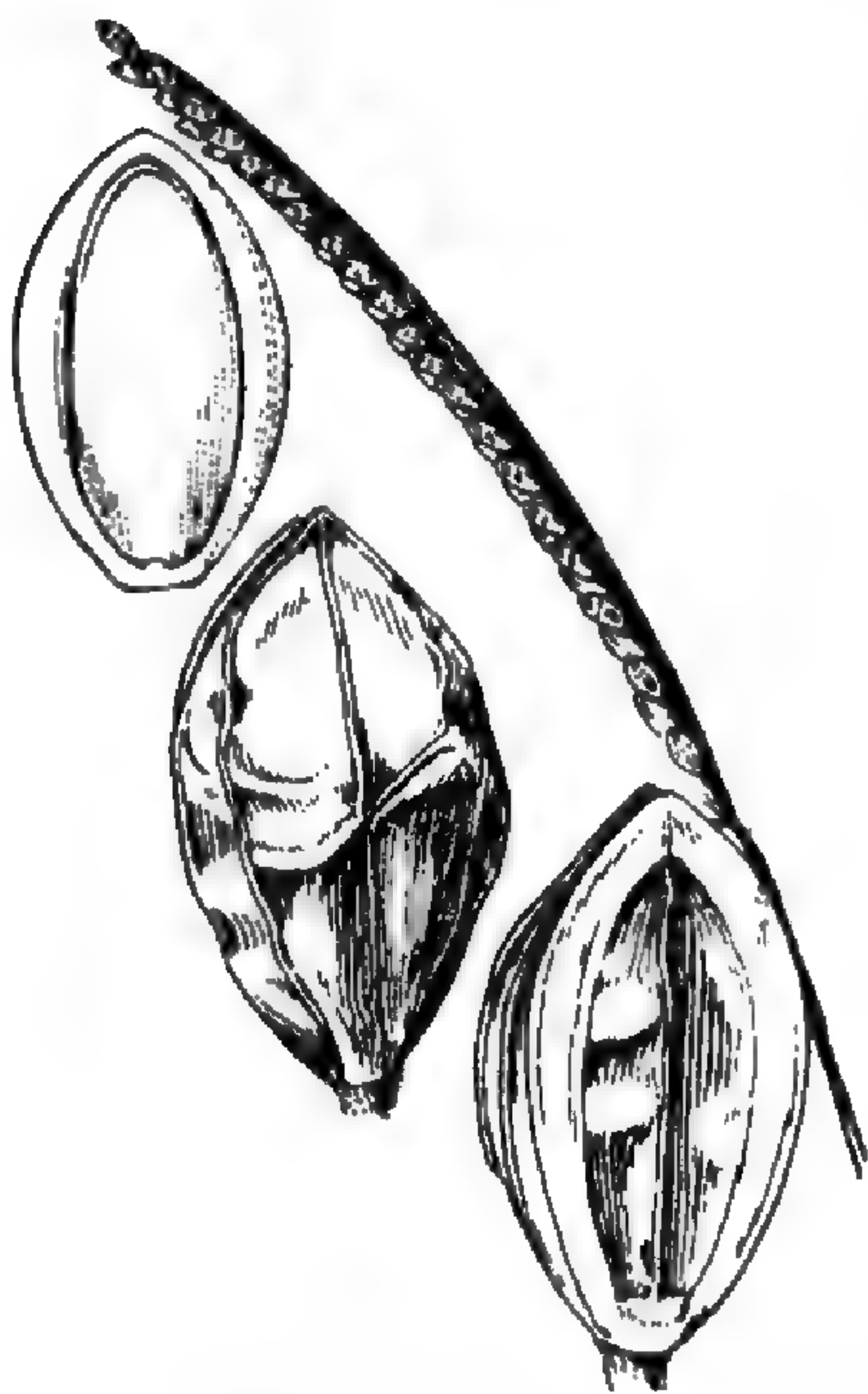


FIGURE 87.—*P. nanum*. From Wright 3842

DESCRIPTION

A slender perennial, cespitose from a knotted crown; culms erect or ascending, 15 to 40 cm., rarely more than 25 cm., tall, slender, compressed; nodes pubescent, occasionally glabrate; sheaths densely velvety papillose-pubescent; ligule about 1 mm. long; blades spreading, 3 to 13 cm. long, 3 to 4.5 mm. wide, flat or drying involute, the lower surface velvety like the sheaths, the upper densely to sparsely pilose; raceme solitary, arcuate or nearly straight, 1.5 to 4 cm. long; rachis slender, plano-convex, obscurely to conspicuously hairy at the base; spikelets solitary, appressed, those of a row not imbricate, 2.4 to 2.8 mm. long, 1.4 to 1.8 mm. wide, oval-elliptic, the glume and sterile lemma less firm in texture than in *P. lindenianum*,

the lemma less inflated and crumpled, the glume from slightly to conspicuously cross-wrinkled; fruit yellowish, about 2 mm. long, 1.2 mm. wide, minutely striately roughened.

This species is apparently rare.

DISTRIBUTION

Low sandy pinelands and brushy savannas, central and western Cuba and Isle of Pines.

CUBA: Santiago de los Baños, Léon 4570. Herradura, Ekman 10784, 14093, 14104, in *Amer. Gr. Nat. Herb.* 948; Hitchcock 462. Vuelta-abajo, Wright 3866. Hanábana, Wright 176. Isle of Pines, Ekman 12190. Without locality, Wright 3842.

87. *Paspalum insulare* Ekman, sp. nov.

DESCRIPTION

A slender tufted olivaceous perennial; culms solitary or few together with numerous erect leafy basal shoots, simple, erect or ascending, 40 to 55 cm. tall, compressed, glabrous; nodes densely appressed-pubescent; sheaths shorter than the internodes, densely papillose-pilose; ligule about 1 mm. long; blades flat, erect or ascending, 6 to 16 cm. long, 3 to 5 mm. wide (the uppermost rudimentary), papillose-pilose on both surfaces, the pale mid nerve prominent beneath;

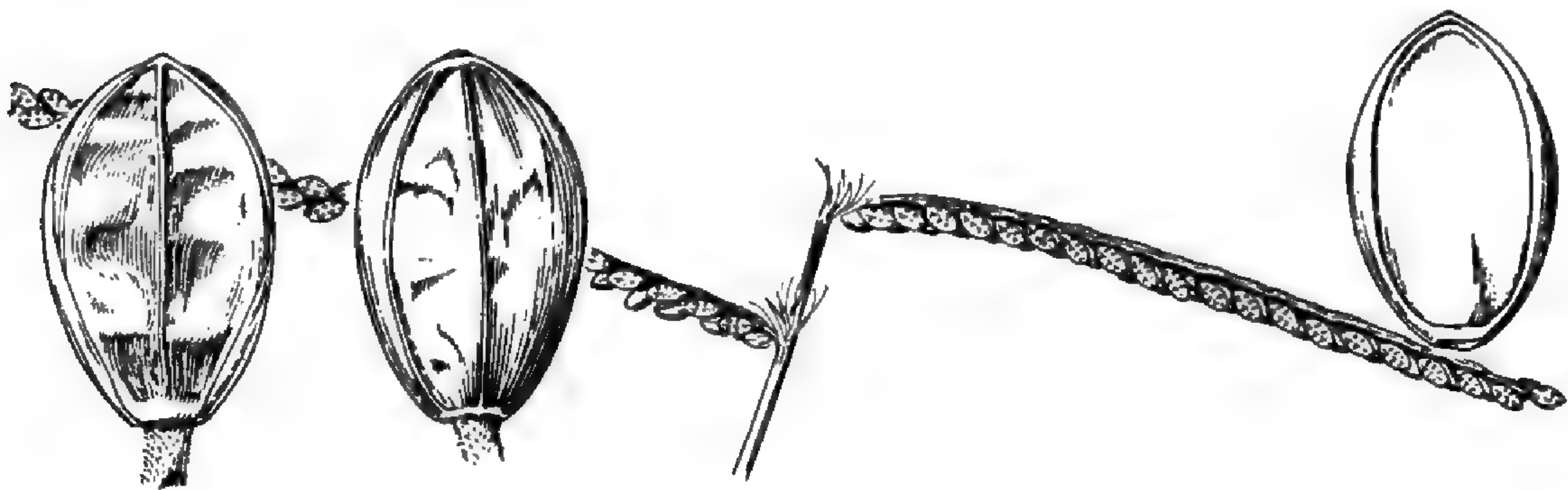


FIGURE 88.—*P. insulare*. From type specimen

racemes 1 or 2, approximate, arcuate to horizontally spreading, 3 to 6.5 cm. long; rachis nearly flat, about 1.5 mm. wide, flexuous with a dense tuft of white hairs at base; spikelets solitary, 2.5 to 2.6 mm. long, 1.5 to 1.6 mm. wide, obovate-elliptic, greenish stramineous; glume and sterile lemma equal, 5-nerved, both, especially the lemma, loose and cross wrinkled; glabrous; fruit pale stramineous, about 2.3 mm. long, very minutely striate-roughened.

Type in the U. S. National Herbarium, no. 1298149, collected in moist places between Santa Ana and Santa Barbara, Isle of Pines, October 29, 1920, by Dr. E. L. Ekman (no. 11957).

This species differs from the others of this group in the scarcely cylindric usually paired racemes.

DISTRIBUTION

Sandy savannas, pinelands and moist places, Isle of Pines.

CUBA: Isle of Pines, Santa Barbara, Ekman 11957, 12220; Taylor 40.

Rupestria.—Densely tufted perennials with slender or filiform culms and narrow blades; ligule about 0.5 mm. long; racemes slender, solitary (sometimes 2 in *Paspalum sauetii*); spikelets minute. Confined to the West Indies.

Blades filiform, subterete.....90. *P. capillifolium*.

Blades not filiform, flat, folded or involute.

Spikelets elliptic, glabrous.....88. *P. rupestre*.

Spikelets oval, pubescent.....89. *P. sauetii*.

88. *Paspalum rupestre* Trin.

Paspalum rupestre Trin. *Linnaea* 10: 293. 1836. "Cuba, in rupibus aridis," the specimen collected by Pöppig. The type, in the Trinius Herbarium at Leningrad, is a depauperate plant, the blades folded or involute, the racemes 15 to 18 mm. long, the spikelets 1.2 mm. long.

Paspalum leoninum Chase in Hitchc. Bot. Gaz. 51: 300. 1911. "Type in U. S. National Herbarium, no. 618 754; collected August 30, 1909, on 'Obispo Hill, near Sancti Spiritus,' by Brother Léon (no. 950)." This specimen has flexuous culms 15 to 25 cm. long, racemes 20 to 35 mm. long, and spikelets 1.4 to 1.5 mm. long.

DESCRIPTION

A slender cespitose perennial, in favorable situations forming cushions; culms from suberect to radiate-reclining, simple or branching at the lower node, the branch similar to the main culm or a long-peduncled raceme only, filiform, compressed, often sinuous, 10 to 40 cm. long, glabrous; node 1 above the basal foliage, appressed-pubescent; leaves crowded at the base, the short overlapping

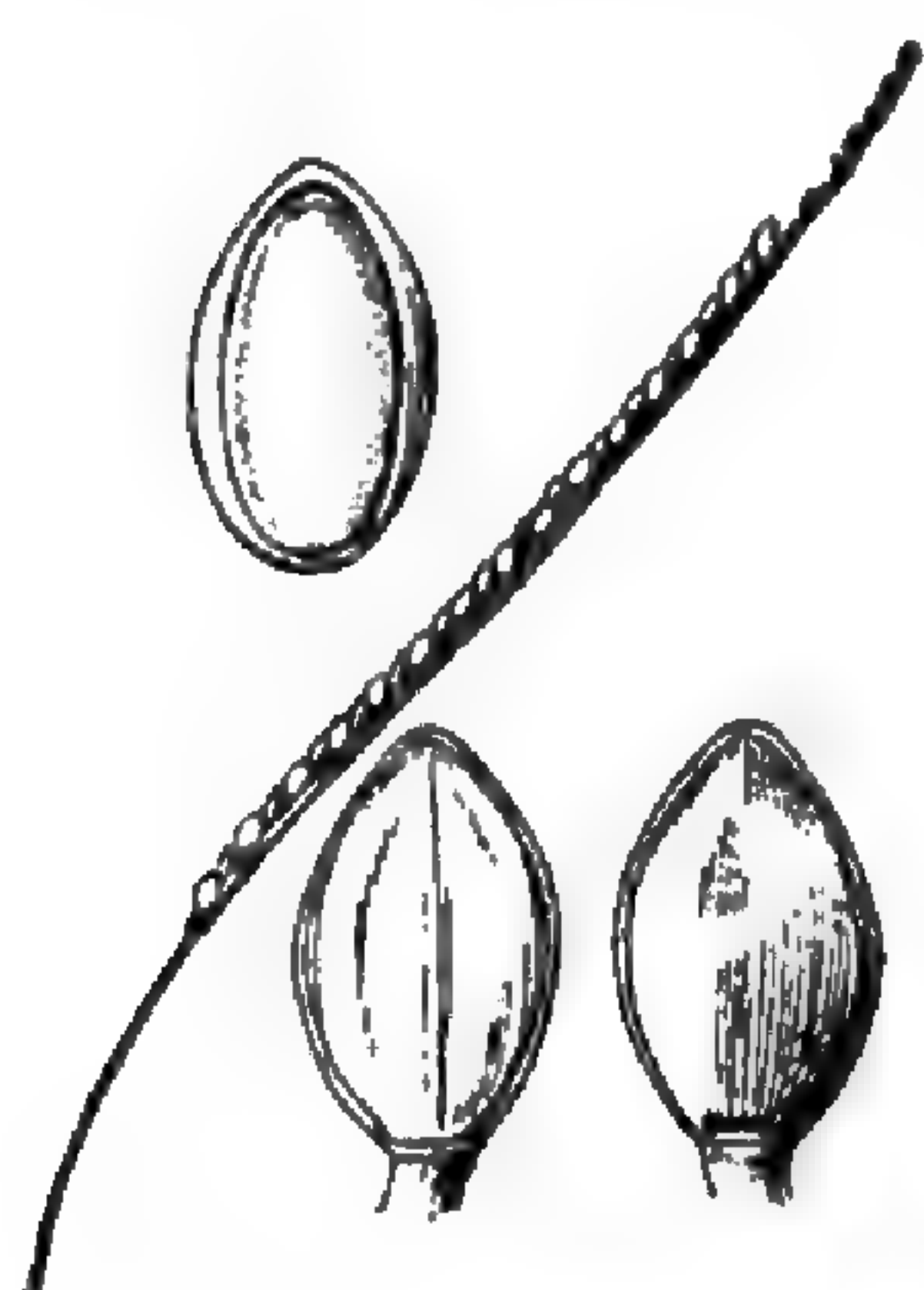


FIGURE 89.—*P. rupestre*.
From type specimen of
P. leoninum

sheaths compressed-keeled, pilose at least along the margin, and with a few stiff hairs on the minute auricles, the edges thin, the sheath of the midculm sparsely pilose on the margin, bladeless; blades folded at base and as wide as the sheaths, flat above, or in dry situations folded or subinvolute and more or less tortuous, 3 to 12 cm. long, 1.5 to 4 mm. wide, glabrous on both surfaces or obscurely puberulent on the upper, a few stiff hairs on the margins and occasionally on the upper surface; raceme solitary, straight or falcate, 1.2 to 4.5 cm. long, sometimes purplish; rachis slender, minutely puberulent and with a few white hairs at the base; spikelets solitary, appressed, 1 to 1.5 mm., mostly 1.2 to 1.3 mm., long, 0.8 to 0.9 mm. wide, elliptic, usually slightly unsymmetrical, glabrous, the pedicels flat, usually scabrous; glume and sterile lemma equal, covering the fruit, 2 or 3 nerved, the mid nerve of the glume commonly suppressed; fruit nearly the size and shape of the fruit, light brownish-stramineous.

Plants growing in rich humus form dense cushions with waxy-green foliage, which, however, dries dull green. In exposed dry stony places the plants form small tufts with fine tortuous olivaceous foliage.

Grisebach²⁷ referred Wright 3445, a specimen of *P. rupestre*, to *P. lindenianum* Rich., "ex descr." Wright²⁸ referred his no. 3445 to *Paspalum rupestre*, but gave Nees as author. The Wright specimens distributed under no. 3445 consist of both *P. rupestre* and *P. saugeti*.

In Hitchcock's no. 23424 and Chase 6315 a few of the culms bear two racemes.

DISTRIBUTION

Open rocky slopes, mostly serpentine, Cuba and Porto Rico.

CUBA: San Claudio, *Ekman* 12998. Guanabacoa, *Hitchcock* 23234; *Léon* 949, 2691; *Léon & Arsène* 11010. San Miguel de Casanova, *Léon* 12470. Campo Florido, *Léon* 3482. Amaro, *Léon* 9142. Cienaga de Zapata, *Roig & Cremata* 2116. Sancti Spíritus, *Léon* 950. Guaro, *Hitchcock* 23417, 23419½, 23424. Baraguá, *Hitchcock* 23355. Sierra de Nipe, *Ekman* in *Amer. Gr. Nat. Herb.* 949. El Yunque, *Shafer* 7729. Jauco, *Léon* 12302. Baracoa, *Wright* 3445 in part.

HAITI: Gros Morne, *Ekman* H 4919.

PORTO RICO: Mayaguez, *Amer. Gr. Nat. Herb.* 567; *Chase* 6259, 6274, 6275, 6299, 6312, 6315, 6323, 6811, 6813; *Holm* 152. Maricao, *Chase* 6220, 6246.

²⁷ Cat. Pl. Cub. 230. 1866.

²⁸ Anal. Acad. Cienc. Habana 8: 202, 1871; *Wright & Sauv. Fl. Cubana* 194-1873.

89. *Paspalum sauetii* Chase, sp. nov.

DESCRIPTION

A caespitose perennial with tough matted roots; culms usually 15 to 40 cm. tall, simple or rarely branching, very slender but wiry, leaning or spreading, flattened, more or less twisted and tortuous, glabrous; nodes appressed-pubescent; leaves mostly crowded toward the base, the lower sheaths overlapping, the upper sheath remote, bladeless or nearly so; sheaths hirsute along the margin and at the summit, sometimes sparingly so throughout; blades rather thick, usually flat when fresh, folded or involute in drying, more or less tortuous, sometimes conspicuously so, 3 to 15 cm. long, 3 to 7 mm. wide, a few hairs above the ligule, otherwise glabrous, or sometimes sparsely pilose; racemes commonly solitary, sometimes a second, 1 to 1.5 cm. distant, 2 to 4 cm. long, erect or falcate; rachis 1 mm. wide, glabrous or minutely strigose, bearing a few long hairs at the base, spikelets solitary (the second spikelet of the pair undeveloped) or paired; pedicels about 0.8 mm. long, flattened, glabrous or nearly so; spikelets 1.3 to 1.6 mm. long, 1 to 1.1 mm. wide, oval, blunt; glume and sterile lemma covering the fruit, 3-nerved, appressed-pubescent or the lemma sometimes glabrous; fruit pale.



FIGURE 90.—*P. sauetii*.
From type specimen

Type in the U. S. National Herbarium, no. 1,060,707, collected on open hillside near Havana, Cuba, October 9, 1919, by Brother Léon (no. 8982).

This species has been confused with *Paspalum rupestre* Trin., from which it differs in its less delicate habit and longer foliage, and in the larger pubescent spikelets. It is named for Brother Léon, Dr. Joseph Sylvestre Sauget. When *P. leoninum* was described it was differentiated from this species, which was supposed to be *P. rupestre* Trin. In the Grasses of the West Indies²⁹ this was tentatively referred to *P. poiretii* Roem. & Schult., but that proves to be the same as *P. caespitosum*.

The culms usually have only one node above the basal foliage, but rather frequently the one below this is apparent above the tuft. In Hitchcock's no. 9482 the long delicate culms have 2 nodes and the foliage is soft and, especially the sheaths, minutely sparsely pilose. Ekman's no. 690 is a stout immature plant with blades as much as 9 mm. wide, paired racemes, and paired spikelets.

DISTRIBUTION

Rocky, mostly limestone soil in the Greater Antilles.

CUBA: Between Cape San Antonio and Morro de Piedras, *Roig* 3255. Habana, *Ekman* 697; *Léon* 286, 948, 1527, 3694, 4664, 7499, 8982. Cojimar, *Baker & O'Donovan* 4417; *Ekman* 16904, in *Amer. Gr. Nat. Herb.* 950, *Hitchcock* 459, 461; *Léon & Hioram* 5602. Triscornia, *Hitchcock* 458. Puentes Grandes, *Léon* 935b. Banao Hills, *Léon* 3980. Cupey, *Ekman* 6337. Guantánamo, *Hioram* 2633. Jauco, *Léon* 12450. Baracoa, *Shafer* 3951; *Wright* 3444 in part, 3445 in part. JAMAICA: Troy, *Harris* 12620a. Ipswich, *Hitchcock* 9599. New Forest, *Hitchcock* 9832. Bull Head Mountain, *Hitchcock* 9533. Between Ewarton and Moneague, *Hitchcock* 9442. Between Ewarton and Linstead, *Hitchcock* 9465. Claremont, *Hitchcock* 9482, 9516. Yardley Chase, *Harris* 9674. Constant Spring, *Hitchcock* 9275. Buff Bay, *Hitchcock* 9765.

²⁹ Contr. U. S. Nat. Herb. 18: 313. 1917.

HAITI: Ile de la Tortue, *Ekman* H 4228. Ennery, *Leonard* 8810, 10030. Port-au-Prince, *Ekman* H 2210; *Hitchcock* 19886, 19890. Mission, *Leonard* 3627. Fond Parisien, *Leonard* 4075. Etang Pénète, *Ekman* H 334. Morne à Cabrits, *Ekman* H 1018. Morne Rouge, *Ekman* H 690. Aux Cayes, *Ekman* H 61. DOMINICAN REPUBLIC: Haina, *Faris* 89, 107. Azua, *Rose, Fitch & Russell* 4079. PORTO RICO: Aguada, *Chase* 6598. Lares, *Chase* 6588. Between Aguadilla and San Sebastian, *Chase* 6597.

90. *Paspalum capillifolium* Nash

Paspalum capillifolium Nash, N. Amer. Fl. 17: 181. 1912. "Type collected in palm barren, Santa Clara, Cuba, March 29-31, 1910, Britton & Wilson 6116 (herb. N. Y. Bot. Gard.)." The type consists of two tufts with immature flowering culms 5 to 12 cm. long.

DESCRIPTION

A slender cespitose perennial, with a few delicate culms rising from a mass of filiform curled foliage; culms reclining, 10 to 35 cm. long, compressed, sometimes loosely twisted and sinuous, simple, with a single node above the basal foliage, the culm and node glabrous; leaves crowded at the base, the short overlapping sheaths brown with thin margins, glabrous; blades folded and curled, 3 to 15 cm. long, about 0.3 mm. wide as folded, sometimes with a few hairs on the upper surface at base, the blade of the midculm reduced or wanting; raceme solitary, straight, 2 to 4 cm. long, very slender, mostly cylindrical; rachis slender, scaberulous on the margin, obscurely pubescent at the very base; spikelets solitary, appressed, 1.7 mm. long, about 0.7 mm. wide, elliptic, the narrow blunt apex folded into a minute point at maturity, mostly slightly unsymmetrical, glabrous; glume and sterile lemma subequal, covering the fruit, 3-nerved, thin in texture and often obscurely wrinkled; fruit pale.

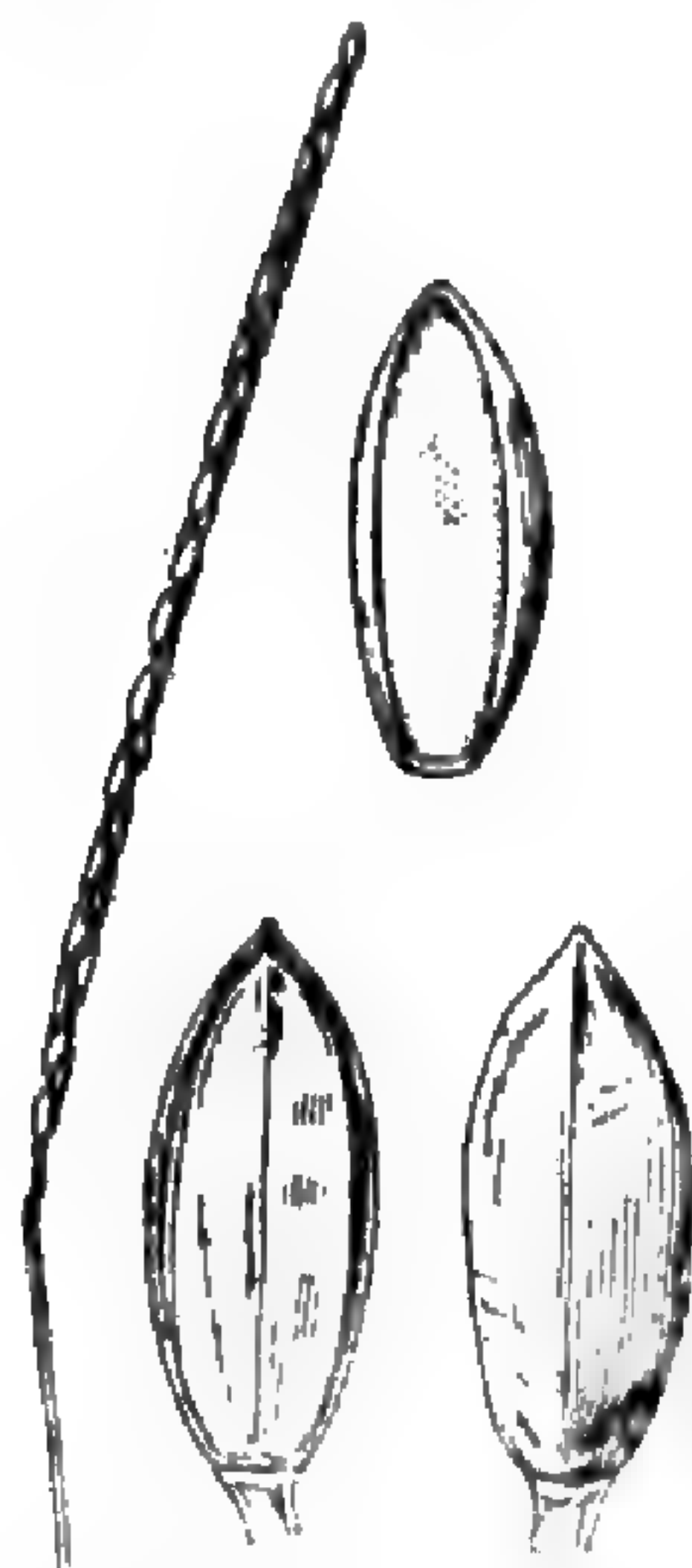


FIGURE 91.—*P. capillifolium*. From *Léon & Loustalot* 9376

DISTRIBUTION

Palm barrens and savannas, Cuba.

CUBA: Santa Clara, *Britton & Wilson* 6116. Sabana de Motembo, *Léon & Roca* 8223. Baños de Santa Rosalia, *Léon & Loustalot* 9376. Santayana, *Ekman* 19046. Holguin, *Ekman* 7565.

Parviflora.—Small slender annuals (one perennial) branching at the base, the culms of different lengths in the tuft; racemes 1 to 4, slender; spikelets minute. (*Paspalum microstachyum*, a weak annual with several to many racemes and wide blades, is placed in this group for convenience.)

Plants perennial.....95. *P. standleyi*.
Plants annual.

Blades 6 to 20 mm. wide; racemes 6 to 35.....96. *P. microstachyum*
Blades not more than 2.5 mm. wide; racemes not more than 4.

Spikelets solitary.

Spikelets orbicular, usually beaded with globular hairs.....91. *P. multicaule*.

Spikelets elliptic, not beaded.....94. *P. parviflorum*.

Spikelets in pairs.

Glume and sterile lemma covering the fruit.....93. *P. clavuliferum*.

Glume and sterile lemma narrower than the fruit, exposing it on the sides.

92. *P. pictum*.

91. *Paspalum multicaule* Poir.

Paspalum multicaule Poir. in Lam. Encycl. Suppl. 4 : 309. 1816. "Cette plante croît au Brésil. (V. s. in herb. Desfont. & Desv.)." The type, bearing the name in Poiret's script, was examined in the herbarium of the Botanic Garden, Florence. The spikelets are nearly glabrous, only a few globular hairs being borne near the margins of the glume and sterile lemma.

Paspalum papillosum Spreng. Nov. Prov. Hal. 47. 1819. "Habitat in Brasilia. Otto." The type, bearing the name in Sprengel's script was examined in the Berlin Herbarium. The spikelets are densely to sparsely beaded with globular hairs.

Paspalum horticola maritimum Salzm.; Doell in Mart. Fl. Bras. 2²: 54. 1877. "Locis cultis mari adjacentibus vel propinquis (n. 677)" Salzmann, Bahia. A specimen so named by Salzmann, part of the type collection, is in the United States National Herbarium. The spikelets are plentifully beaded with globular hairs.

DESCRIPTION

A slender annual in dense tufts, often forming mats; culms branching at the lower nodes, spreading or ascending, 20 to 45 cm., rarely to 60 cm., tall, glabrous; nodes glabrous or nearly so; sheaths strongly keeled, densely papillose-pilose with long hairs on the margin, at least toward the summit, commonly on the keel also, and often throughout, the lower broad and overlapping, sometimes nearly glabrous; ligule very minute, with a ring of hairs 0.5 to 1 mm. back of it; blades flat, drying revolute and often tortuous, ascending, 2 to 15 cm. long, 1.5 to 2.5 mm. wide (the uppermost rudimentary), conspicuously papillose-pilose and with a dense short pubescence as well on both surfaces, the under surface, under a lens, minutely papillose-roughened, the mid nerve and thickened margins prominent beneath; racemes 2, rarely 1 or 3, paired, divergent, 1.5 to 6 cm., commonly 2 to 4 cm., long, yellowish, the slender peduncle short-exserted or included, with a pair of membranaceous auricles 0.5 to 1 mm. long on either side between the racemes; rachis about 0.7 mm. wide, minutely winged, scaberulous, pubescent at base; spikelets solitary, 1.2 to 1.4, rarely to 1.5 mm. long, 1 to 1.2 mm. wide, subhemispheric; glume and sterile lemma 3-nerved, or the mid nerve suppressed in the lemma, equal or the glume slightly narrower than the fruit, rarely reduced or wanting, both from sparsely to densely beaded with subglobular hairs, often beaded around the margin only, rarely glabrous, the lemma sometimes pigmented down the mid nerve and near the margin; fruit nearly the size of the spikelet, stramineous, very minutely papillose-striate.

Most of the plants from South America and the West Indies have the characteristically beaded spikelets. Those of continental North America are mostly beaded around the margin only. A few are glabrous and a few plentifully beaded. In the following, all from the Pacific slope of Panama, the second glume is wanting in all or in some of the spikelets: Killip 4134, Pittier 4515, 4622, 4866, 4871. In the first (two specimens with 15 pairs of racemes) the spikelets are uniformly without the glume and the sterile lemma is glabrous or with a few globular hairs only. In all the others the spikelets of some of the racemes are without glumes and some with glumes. In most cases spikelets with well developed glumes, small narrow glumes, and glumes wanting, are found in a single raceme. If it were not for these specimens Killip 4134 would seem to be worthy of subspecific rank.

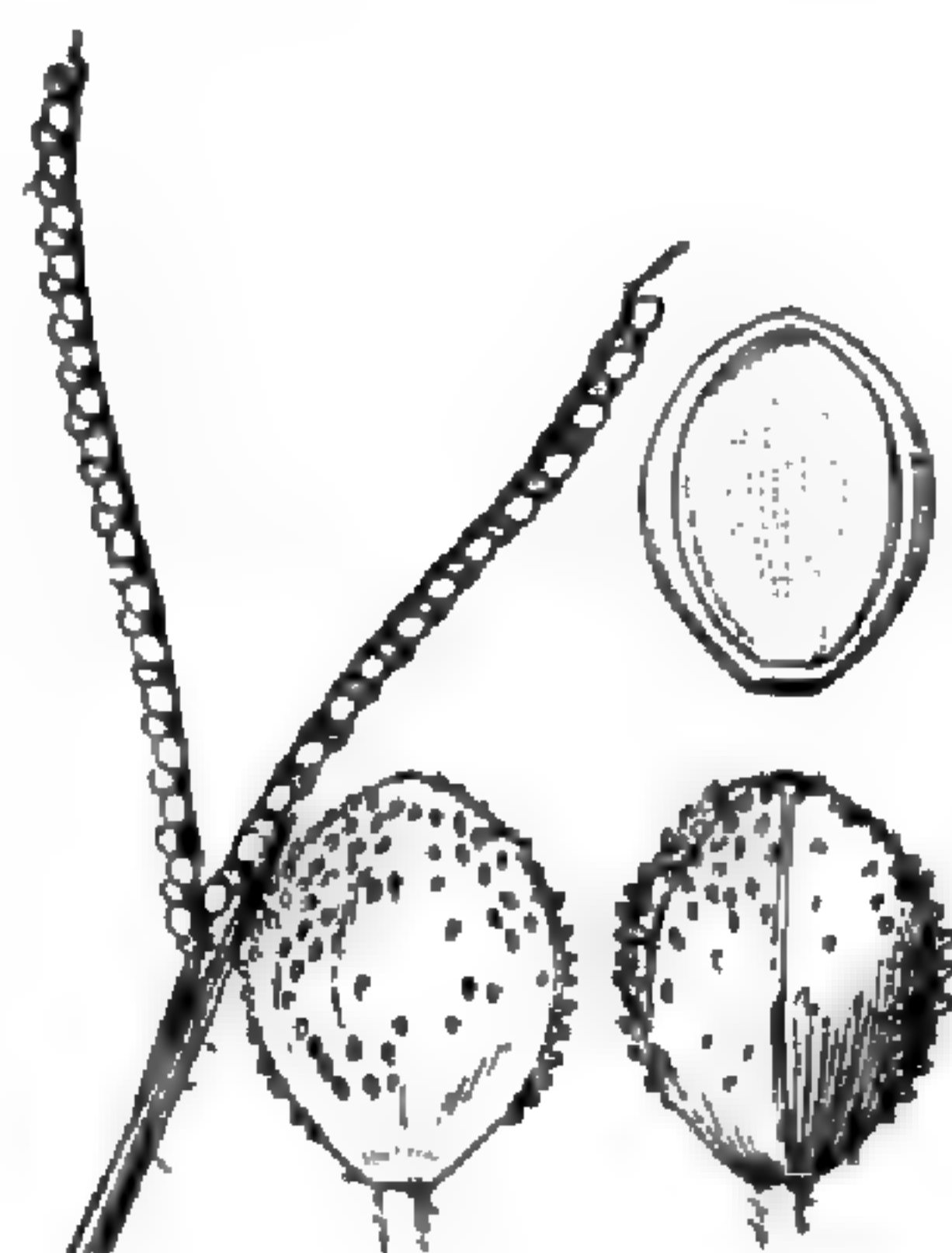


FIGURE 92.—*P. multicaule*.
From type collection of
P. papillosum

DISTRIBUTION

Moist eroded places in savannas and open, usually disturbed or washed ground, mostly at low altitudes; southern Mexico to Brazil and Bolivia; also Trinidad.

VERA CRUZ: Minatitlán, *Smith* 564.

HONDURAS: Siguatepeque, *Standley* 55851.

COSTA RICA: Gresca, *Jiménez* 1123. Buenos Aires, *Tonduz* 4869b. Boruca, *Tonduz* 4470, 4474.

PANAMA: San Felix, *Pittier* 5149. Aguadulce, *Pittier* 4866, 4871. Canal Zone, *Hitchcock* 9188, 9197½. Juan Díaz, *Killip* 4134. Chepo, *Pittier* 4515, 4622.

CUBA: Laguna Santa Barbara, *Ekman* 18115. Mendoza, *Shafer* 10862. Herradura, *Baker & Abarca* 4185; *Hitchcock* 472. Chiragota, *Wright* 3844 in part. Isle of Pines, *Britton & Wilson* 14805.

DOMINICAN REPUBLIC: Cotuy, *Abbott* 850b.

TRINIDAD: Piarco Savanna, *Broadway* 2126; *Hitchcock* 10340; *Warming* 839.

O'Meara Savanna, *Britton & Hazen* 1572. Pitch Lake, *Amer. Gr. Nat. Herb.* 574.

COLOMBIA: Santa Marta, *Smith* 2158. Mesa de los Santos, *Killip & Smith* 15236.

VENEZUELA: Mene Grande, *Pittier* 11001.

BRITISH GUIANA: Penal Settlement, *Hitchcock* 17081, 17104, 17105, 17137. Bartico, *Hitchcock* 17187. County Berbice, *Abraham* 98.

FRENCH GUIANA: Cayenne, *Broadway* 170. Without locality, *Leprieur* 83.

BRAZIL: Santarem, *Spruce* in 1849-50. Marajó Island, *Goeldi* 183. Pará, *Goeldi* 13. Castanhal, *Goeldi* 304. Maceió, *Chase* 7854. Parafuso, *Chase* 7986. Bahia, *Chase* 7884; *Salzmann*. Serra do Cipó, *Chase* 9190. Without locality, *Burchell* 1565 (*P. conjugatum* and *P. vaginatum* mixed with *P. multicaule*); *Riedel* 29.

PERU: Colonia Perené, *Hitchcock* 22087.

BOLIVIA: Tipuani, *Bang* 1426a. San Carlos, *Buchtien* 16 in 1927.

92. *Paspalum pictum* Ekman

Paspalum pictum Ekman, Ark. för Bot. 10¹⁷: 11. pl. 1, f. 6. 1911. "Prov. Matto Grosso, Cuiabá, loco humido, argilloso, aprico ad rivulum, * * * legit G. O. Malme, 2.5.03, sub numero 3222 Exp. II Regn." The type specimen, in the Stockholm Herbarium, bearing the name and "orig. spec." in Ekman's script, has spikelets more strongly pigmented than in any of the other specimens examined.

Paspalum macidatum Nash, N. Amer. Fl. 17: 186. 1912. "Type collected on the savannas of Boruca, Costa Rica, November 1891, *Pittier* 4474 (herb. John Donnell Smith, in herb. U. S. Dep. Agr.)." In this specimen, now in the United States National Herbarium, the glume and sterile lemma are pigmented at the summit only.

DESCRIPTION

A slender tufted annual; culms branching from the lower nodes, erect, the base often curved, 25 to 50 cm. tall, glabrous; nodes glabrous; sheaths keeled, glabrous, the lower broad and overlapping; ligule 1.5 to 2 mm. long; blades folded, the junction with the sheath obscure, erect, or tortuous and spreading in age, 4 to 18 cm. long, 1.5 to 2 mm. wide opened out (the upper rudimentary), sparsely papillose-pilose on the upper surface toward the base; racemes 1 to 4, commonly 2, about 0.5 to 1 cm. distant, arcuate-spreading, strongly curved in age, 1.2 to 5 cm. long, yellowish, the slender peduncle short-exserted or, especially on the branches, included in the sheath; rachis very slender with a few long hairs at the base, otherwise glabrous; spikelets in pairs on slender smooth pedicels, crowded, 1 to 1.1 mm. long, about 0.7 mm. wide, obovate-pyriform, turgid, glabrous; glume

and sterile lemma very thin in texture, 3 to 5-nerved (or the midnerve suppressed in either), both narrower and the glume a little shorter than the fruit, usually pigmented at the tip and occasionally elsewhere with dark purple; fruit pale, papillose-roughened.

DISTRIBUTION

Moist places in savannas, Costa Rica to Brazil and Bolivia.

COSTA RICA: Boruca, *Pittier* 4474.

COLOMBIA: Llano de San Martín, *Karsten*. Vil-lavicencio, *Pennell* 1437.

BRAZIL: Cuyabá, *Malme* 3222. Est. Rio de Janeiro, *Glaziov* 22597 in part.

BOLIVIA: Buenavista, *Steinbach* (*Herb. Osten*) 14954.



FIGURE 93.—*P. pictum*. From duplicate type

93. *Paspalum clavuliferum* Wright

Paspalum clavuliferum Wright, Anal. Acad.

Cienc. Habana 8: 203, 1871; Fl. Cub. 195.

1873. "[3444 p. p.]" The type, collected by

"C. Wright in Cuba. Orientali, 1859, 1860," is in the Gray Herbarium. Three peduncles bear a solitary raceme, the fourth a pair. The spikelets are 1.2 to 1.4 mm. long, sparsely pubescent with capitellate hairs.

Paspalum falcula Doell in Mart. Fl. Bras. 2²: 61. 1877. "Habitat locis cultis prope Bahia (Salzmann n. 1830), nec non a cl. Lhotsky (n. 68) in Brazilia lectum (herb. Reg. Berolin.)." A specimen named *Paspalum horticola* by Salzmann (see below), collected "in locis cultis prope Bahia," is in the United States National Herbarium. Several duplicates of this collection have been examined, but none bear the number 1830. In Doell's herbarium in Freiburg is a specimen of "Salzmann 1834" bearing the name in his script. The spikelets of these Salzmann specimens are 1.1 to 1.2 mm. long, pubescent with capitellate hairs.

Paspalum horticola Salzm.; Doell in Mart. Fl. Bras. 2²: 60, 1877 as synonym of *P. falcula*, Salzmann 675 being cited. Several Salzmann specimens bearing this name have been examined but none bear this number.

Paspalum pittieri Hack.; Beal, Grasses N. Amer. 2: 88. 1896. "Mexico, *Pringle* 2359." The type, collected in "Wet places, hills near Guadalajara, Jalisco, 19, October, 1889," is in the herbarium of the Michigan Agricultural College. Solitary and paired racemes are borne on the same plant. The spikelets are 1.4 mm. to 1.5 mm. long, sparsely pubescent with capitellate hairs. This name was earlier listed without description by Tonduz,³⁰ and was later published as new by Hackel³¹ himself, who cited "Costa Rica: Llanos de Tunicares (650 m). *Pittier* nr. 507." This specimen, in the Hackel Herbarium, bears the name in Hackel's script. The spikelets are glabrous, 1.2 to 1.3 mm. long.

DESCRIPTION

A very slender tufted annual; culms branching at the lower and sometimes at the middle nodes, erect to spreading, 5 to 45 cm. tall, glabrous; nodes glabrous; sheaths keeled, sparsely papillose-pilose to glabrous except near the margin toward the summit, the lower mostly overlapping; ligule 0.5 to 1 mm.

³⁰ Bull. Herb. Boiss. 3: 461. 1895.

³¹ Oesterr. Bot. Zeit. 51: 234. 1901.

long; blades flat or slightly revolute, ascending, 3 to 16 cm. long, 1.5 to 3 mm. wide (the uppermost rudimentary), sparsely to rather densely papillose-pilose on both surfaces and commonly short-pubescent as well as on the upper, occasionally on both surfaces, the lower under a lens minutely papillose-roughened, the mid nerve prominent beneath; racemes solitary or paired, rarely with a third

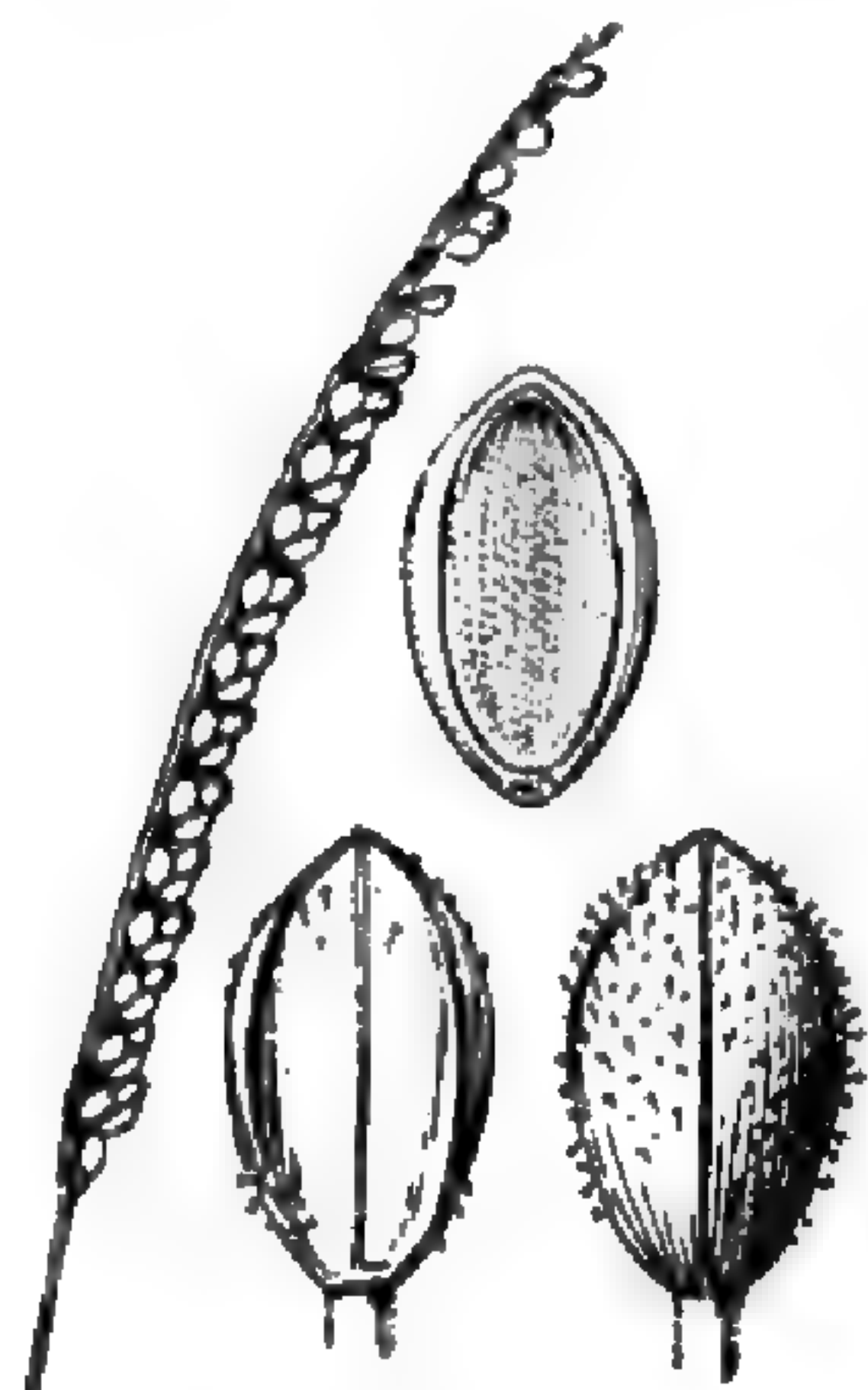


FIGURE 94.—*P. clavuliferum*. From duplicate type

below, arcuate, 1 to 5.5 cm. long, the filiform peduncle finally long-exserted; rachis about 0.5 mm. wide, minutely scaberulous, commonly short-pubescent at base; spikelets paired, the secondary one sometimes rudimentary, loosely crowded, 1.2 to 1.4 mm. long, rarely only 1.1 or as much as 1.5 mm. long, about 0.8 mm. wide, elliptic-obovate; glume and sterile lemma 3-nerved, or the mid nerve suppressed in the lemma, the glume equaling the lemma or slightly shorter, from very sparsely to rather densely pubescent with capitellate hairs, the lemma glabrous or with a few hairs, rarely both glabrous; fruit nearly the size of the spikelet, stramineous, minutely papillose-roughened.

This weedy little annual varies in the size of the spikelets and in the amount of pubescence. The Salzmann collections, upon which *P. falcula* is based, and *Pringle* 2359, the type of *P. pittieri*, represent the extremes. Other collections from Brazil and from Mexico have spikelets from 1.2 to 1.4 mm. long, as in *Wright* 3444, the type of *P. clavuliferum*.

DISTRIBUTION

Moist spots in sandy savannas and barrens, eroded places in open or brushy slopes, waste and cultivated ground, mostly at low altitudes; southern Mexico, Cuba, and Porto Rico to Brazil.

JALISCO: Guadalajara, *Pringle* 2359, 11762.

COLIMA: Alzada, *Hitchcock* 7065.

COSTA RICA: Llanos de Tunicares, *Pittier* 507.

PANAMA: Chepo, *Pittier* 4525.

CUBA: La Coloma, *Ekman* in *Amer. Gr. Nat. Herb.* 954. Cajalbana, *Léon & Charles* 4858. Jagüey Chico, *Ekman* 16982. Gavilanes, *Léon & Clement* 6655. Placetas del Sur, *Léon* 6417, 6418. Zaza de Tunas, *Léon* 942. Baraguá, *Hitchcock* 23379½. Guaro, *Hitchcock* 23430. Eastern Cuba, *Wright* 3444 in part.

PORTO RICO: Campo Alegre, *Stevenson* 2454.

COLOMBIA: Santa Marta, *Smith* 175.

BRITISH GUIANA: Rupununi Savanna, *Melville* 109.

BRAZIL: Cachoeira, *Chase* 8094, 8107½. Parafuso, *Chase* 7979. Bahia, *Salzmann*. Serra do Cipó, *Chase* 9111. Lagoa Santa, *Chase* 8987. Bello Horizonte, *Chase* 8908. Pernambuco, *Pickel* 1584, 1605.

94. *Paspalum parviflorum* Rohdé

Paspalum parviflorum Rohdé; Flüge, Monogr. Pasp. 98. 1810. "Insula Portorico. Exemplar pulcherrimum liberalitati Amicissimi Rohdédi debeo." Flüge's types have not been located. A specimen in the British Museum "ex herb. Nolte" collected in Porto Rico by Rohdé in 1809, and one in the Willdenow Herbarium from Porto Rico may be parts of the type collection. The first is 15 cm. tall, the second 12 cm.

Paspalum vestitum Steud. Syn. Pl. Glum. 1: 17, 1854, as synonym of *P. parviflorum*. "Hrbo. Lenorm. * * * Calcutta." In the Lenormand Herbarium

at Caen is a specimen labeled "Calcutta Wallich E. T. Mr. Babington 1847," which bears the name in Steudel's script. This agrees with the description and is undoubtedly the type, but the label with the locality must have been misplaced. The species is not known from the Eastern Hemisphere. In the Drake Herbarium in Paris is a specimen named *Paspalum vestitum*, but not by Steudel, labeled "Guyane, Leprieur." The type is probably part of the same collection.

Paspalum parviflorum var. *humilis* Nees; Doell in Mart. Fl. Bras. 2²: 45. 1877. No collection is cited here nor by Nees³² in differentiating var. β without naming it. In the Berlin Herbarium is a specimen of Sello's no. 275 bearing the name in Nees' script. A second slip reads "486 Campos Vittoria." The culms are 5.5 to 8 cm. tall.

DESCRIPTION

A slender densely tufted conspicuously pilose annual; culms branching from the lower and middle nodes, ascending or spreading, 4 to 17 cm. tall, glabrous, nodes glabrous; sheaths mostly overlapping, keeled, sparsely to densely papillose-pilose; ligule about 0.2 mm. long; blades mostly flat, ascending, or in age folded and tortuous, 1.5 to 6.5 cm. long, 1 to 2 mm. wide (the uppermost rudimentary), conspicuously papillose-pilose on both surfaces with fine hairs as much as 4 or 5 mm. long, and usually with a short pubescence on the upper surface as well, the mid nerve prominent beneath; racemes 2 to 4, rarely 1, 2 to 10 mm. distant, spreading or reflexed, 6 to 26 mm. long, the filiform peduncle short-exserted or included in the upper sheath; rachis about 0.4 mm. wide, strongly zigzag, triangular, scabrous on the angles and usually with a few long hairs at base; spikelets solitary on flat ascending-ciliate pedicels, not imbricate, 0.8 mm. long, 0.4 to 0.5 mm. wide, oblong-elliptic; glume and sterile lemma hyaline in the middle tearing apart early and toward maturity reduced to a raised rim around the spikelet, the stramineous smooth shining fruit exposed in the middle, the rim under a lens densely covered with very minute capitellate hairs; fruit about the size of the spikelet.

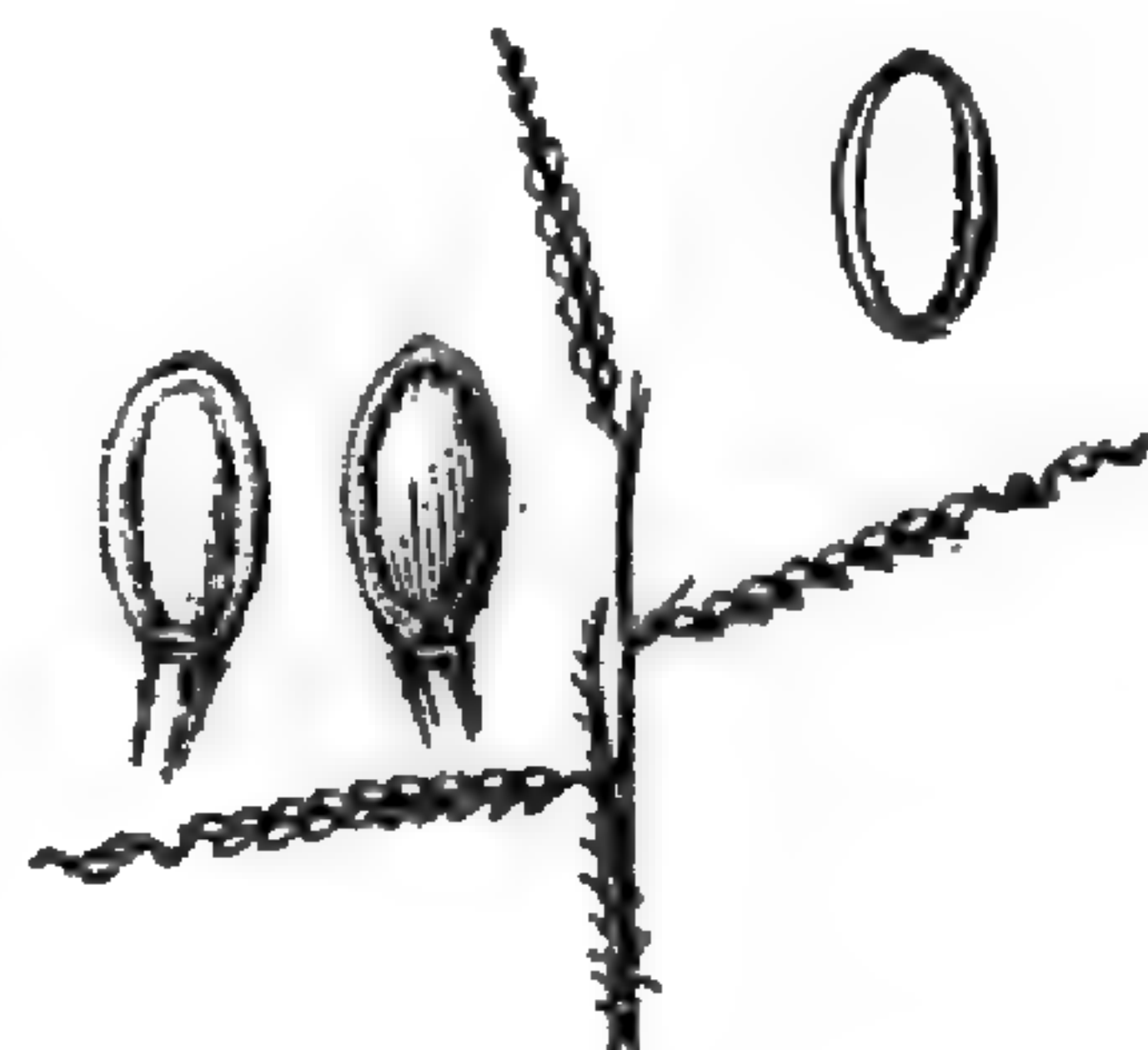


FIGURE 95.—*P. parviflorum*.
From Chase 8001

DISTRIBUTION

Sandy savannas and sand barrens, Panama and Porto Rico to Brazil.

PANAMA: Orange River, Killip 4260.

PORTO RICO: Without locality, Rohde in 1809 (British Museum).

FRENCH GUIANA: Cayenne, Jelski in 1867. Without locality, Leprieur 85.

BRAZIL: Marajó Island, Goeldi 95. Parafuso, Chase 8001. Bahia, Sello 486.

Between Barão de Melgaco and Pimenta Buena, Kuhlmann 1682. Salto Bello, Kuhlmann 1682a. Without locality, Capanema (Jard. Bot. Rio Jan.) 5416.

95. *Paspalum standleyi* Chase

Paspalum standleyi Chase, Journ. Washington Acad. Sci. 17: 146. 1927. "Type in the U. S. National Herbarium, no. 1,269,445, collected in marshy thicket, Juan Díaz, Province of Panama, January 11, 1924, by Paul C. Standley, no. 30543."

³² Agrost. Bras. 50. 1829.

DESCRIPTION

A slender tufted perennial, forming leafy mats, the culms spreading, some of them rooting at the lower nodes or creeping; culms 20 to 27 cm. long,

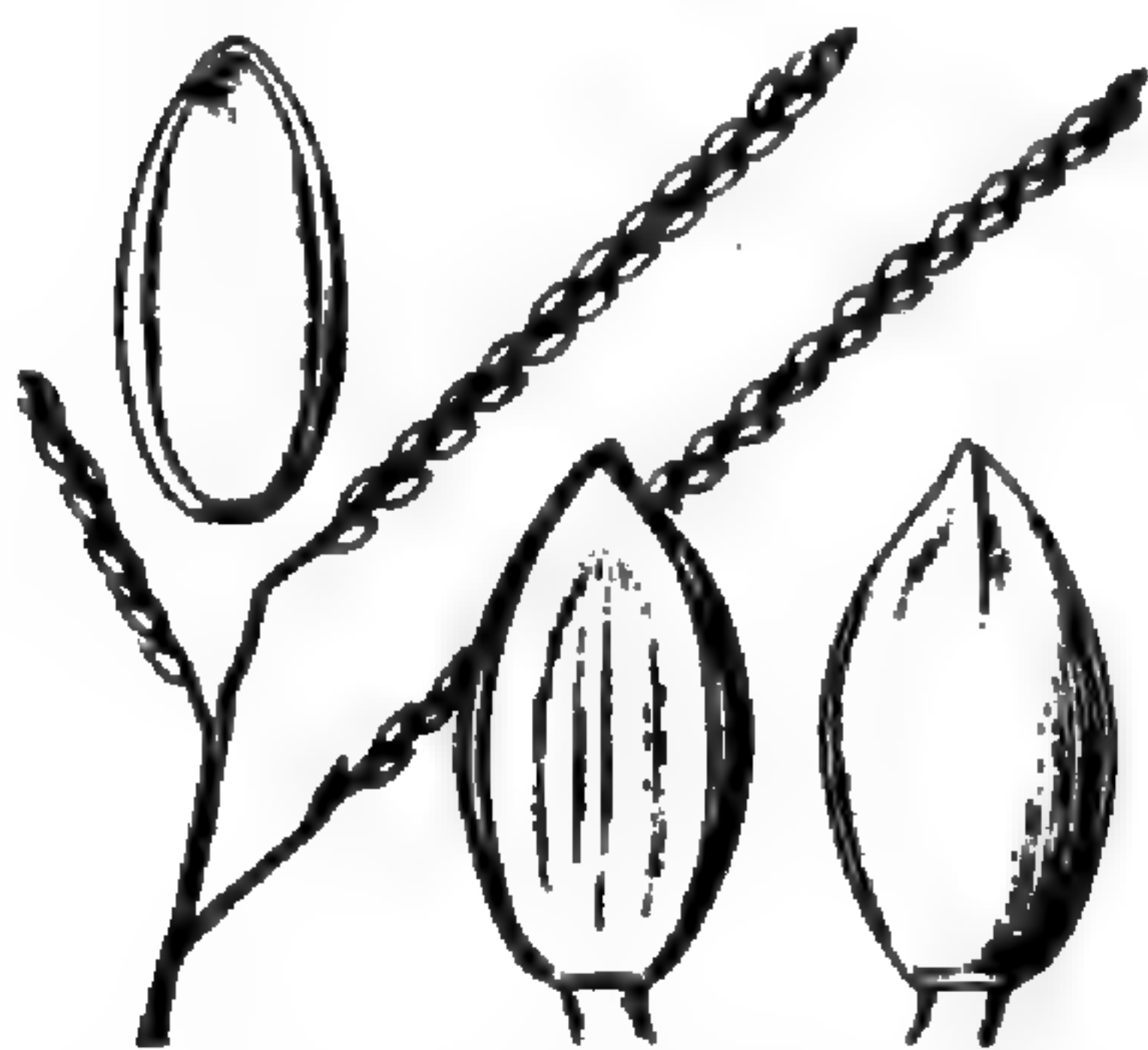


FIGURE 96.—*P. standleyi*. From type specimen

slender, simple or branching at the base, glabrous or sparsely pilose below the nodes; nodes bearded with ascending hairs, the upper sparsely so; leaves aggregate at base, the sheaths keeled, the lower rather broad, papillose-pilose, especially along the mid nerve and margin on the collar, the upper glabrous except on the margin and collar; ligule minute; blades flat, spreading, 3 to 6 cm. long, 3 to 6 mm. wide (upper blades mostly rudimentary), rounded at base, sparsely papillose-pilose on the lower surface, papillose or with a few hairs to glabrous on the upper; racemes 3 or 4, spreading, 2.2

to 4 cm. long, on a slender glabrous common axis 1 to 1.5 cm. long, the axils glabrous or nearly so; rachis slender, dark purplish, glabrous; spikelets solitary on short flat pedicels scarcely imbricate, narrowly ovate, somewhat unsymmetrical, subacute, depressed plano-convex, 1.6 mm. long, 0.9 mm. wide, glabrous, pale or purple-tinged; glume and sterile lemma equal, barely exceeding the fruit, the mid nerve suppressed, the marginal nerves strong, the sterile lemma obscurely longitudinally wrinkled in the middle; fruit 1.5 mm. long, 0.7 mm. wide, pale.

This species is allied to *Paspalum hyalinum* Nees of Brazil, from which it differs in its spreading habit, softer foliage, the blades much shorter and broader, and in the slightly larger spikelets, the thin glume and sterile lemma not hyaline and tearing in the middle as in *P. hyalinum*.

Known only from the type collection.

96. *Paspalum microstachyum* Presl

Paspalum microstachyum Presl, Rel. Haenk. 1: 215. 1830. Habitat unknown. The type, collected by Haenke, was examined in the National Museum at Prague by A. S. Hitchcock. It consists of two fragments of flowering culms. A slip on which is written "Philippines" is pinned to the sheet, but this is obviously by mistake. The pubescence on the spikelets is rather appressed.

Paspalus effusus Nees, Journ. Bot. Kew Misc. 2: 104. 1850. Not *P. effusum* Rasp. 1825. "Gardner hrbr. nr. 4033. Brasilia." The type, bearing the name in Nees' script, is in the herbarium at Cambridge, England. This collection in the Delessert Herbarium is marked "Goyaz." In these specimens the pubescence on the spikelets is rather long and loose.

Paspalum cognatissimum Steud. Syn. Pl. Glum. 1: 18. 1854. "Jameson Hrbr. nr. 552. Guayaquil," Ecuador. The type, bearing the name in Steudel's script, is in the Paris Herbarium. A duplicate in the United States National Herbarium bears a slip in Jameson's script "552. From the level country near Guayaquil." In these the pubescence on the spikelets is appressed, as in Presl's type.

DESCRIPTION

A slender branching annual; culms ascending to erect from a geniculate base, sometimes rooting at the lower nodes, 20 to 135 cm. long, branching at the lower and middle nodes, often purplish, compressed, glabrous; nodes blackish, glabrous; sheaths mostly much shorter than the internodes, keeled, rather loose, glabrous to papillose-pilose; ligule about 0.3 mm. long, with a row of hairs just back of it;

blades flat, rather thin, spreading, 3 to 30 cm. long, 6 to 20 mm. wide, the lower tapering to a narrow base, the middle and upper from rounded to deeply cordate-clasping (the upper not reduced), papillose-ciliate toward the base, from glabrous to papillose-pilose on both surfaces, usually glabrous or only sparsely pilose beneath, the margins very scabrous; panicles terminal and axillary, subpyramidal, lax, nodding, of 6 to 35 slender, spreading or arcuate racemes, solitary or fascicled along a slender, flat axis 5 to 22 cm. long, the lower racemes distant, 3 to 8 cm. long, the upper gradually approximate and shorter; rachis membranaceous, flat, 0.5 to 0.6 mm. wide, bearing a few long hairs at the base and usually with a few scattered along the margin; spikelets in pairs on long slender pedicels, not at all crowded, 1.5 to 1.6 mm. long, about 0.9 mm. wide, elliptic, subacute, rather turgidly plano-convex, olivaceous; glume and sterile lemma equal, thin, 3-nerved, the lateral nerves sometimes faint, pubescent with soft appressed to spreading hairs fruit about 1.5 mm. long, horn-color, smooth and shining.

DISTRIBUTION

Roadsides, waste places, and in cultivated ground, at low altitudes, Guatemala to Ecuador and Brazil.

GUATEMALA: Alta Vera Paz, *Goll* 78.

HONDURAS: Tela, *Standley* 54784. Lancetilla Valley, *Standley* 52837, 53161.

EL SALVADOR: Sonsonate, *Hitchcock* 8980; *Standley* 22287. San Miguel, *Standley* 21086.

NICARAGUA: Masaya, *Hitchcock* 8650. Jinotepe, *Hitchcock* 8714. San Juan del Sur, *Hitchcock* 8602. Ile de Omotepe, *Levy* 1138.

COSTA RICA: Atenas, *Hitchcock* 8523. Puntarenas, *Hitchcock* 8554. Hacienda de Zent, *Tonduz* 362. Matina, *Pittier* 9755.

PANAMA: David, *Hitchcock* 8348. Chorrera, *Hitchcock* 8151. Las Sabanas, *Heriberto* 192. Las Cruces Trail, *Standley* 29142. Canal Zone, *Hitchcock* 8011, 8025; *Killip* 4006; *Pittier* 4436; *Popenoe* 54; *Standley* 25292, 26105. Matías Hernández, *Pittier* 6789. Chepo, *Pittier* 4462. Taboga Island, *Hitchcock* 8069; *Standley* 27083.

COLOMBIA: Santa Marta, *Smith* 214, 2530.

VENEZUELA: Without locality, *Fendler* 1738.

BRAZIL: Goyaz, *Gardner* 4032.

ECUADOR: Guayaquil, *Jameson* 552. Milagro, *Hitchcock* 20177. Between Santa Rosa and La Chorita, *Hitchcock* 21138.

Brevia.—Low tufted perennials with filiform culms and slender stolons; racemes 1 or 2, not more than 15 mm. long. Confined to the West Indies.

Spikelets not wrinkled nor beaked-----97. *P. breve*
Spikelets wrinkled and beaked-----98. *P. edmondi*

97. *Paspalum breve* Chase

Paspalum breve Chase in Urban, Symb. Antill. 7: 166. 1912. "Cuba prov. Habana prope Marianao, 16. Nov. 1910: Fr. Léon n. 1996 (specimen authenticum U. S. Nat. Herb. n. 690378)." The type consists of 2 stoloniferous mats.



FIGURE 97.—*P. microstachyum*. From *Jameson* 552

DESCRIPTION

A low glabrous stoloniferous perennial, in favorable situations forming dense leafy mats; culms mostly numerous in the tuft, subfiliform, flat, 5 to 10 cm. tall, rarely taller; stolons slender with short joints and short pilose scales, bearing leafy shoots at every joint; nodes glabrous; sheaths crowded and overlapping at base, keeled, hyaline-margined, glabrous or with a few scattered hairs, the upper sheath bladeless; ligule scarcely 0.5 mm. long; blades mostly 3 to 6 cm. long, rarely longer, 2 to 4 mm. wide, flat or folded, or subinvolute in drying, sometimes sparsely ciliate toward the base; racemes solitary (rarely a second one below), 8 to 15 mm., mostly about 10 mm., long, the rachis about 0.7 mm. wide, sometimes with a few hairs at the base; spikelets solitary, somewhat imbricate, 1.4 mm. long, 1 mm. wide, broadly oval, rather turgid, the smooth, shining glume and sterile lemma 3-nerved, equal; fruit nearly the size and shape of the spikelet, brownish.

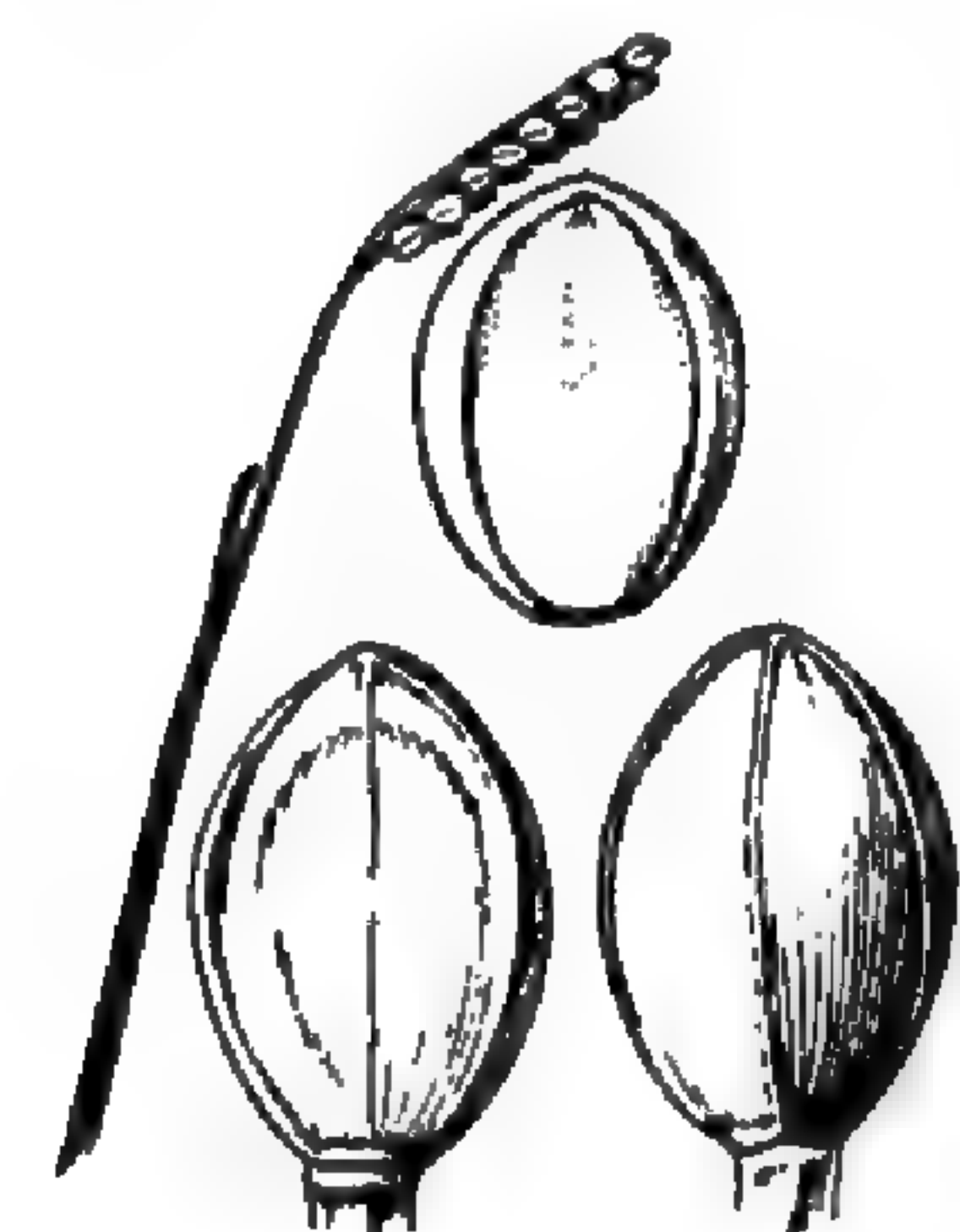


FIGURE 98.—*P. breve*.
From type specimen

Rarely the glume is obscurely ciliate near the base. In Ekman's no. 449 the glumes are ciliate around the margin, one culm is 17 cm. long, the blades are as much as 12 cm. long and pilose in the lower half.

DISTRIBUTION

Stony, mostly calcareous slopes; Cuba and Haiti.

CUBA: Marianao, *Léon* 1996, 3477. Cojimar, *Léon* 1997. Bacuranao, *Wilson & Léon* 2872, 11599. Sierra de Anafe, *Ekman* 16906. Sancti Spiritus, *Léon* 4100. Manatí, *Léon* 5681½. Bayate, *Ekman* 9843. Loma del Gato, *Léon, Clement & Roca* 9811.

HAITI: La Source, *Ekman* H 3379. Grande Riviere, *Ekman* H 449. Pestel, *Eyerdam* 357.

98. *Paspalum edmondi* Léon

Paspalum edmondi Léon in Britton, Mem. Torrey Club 16: 58. 1920. "Palm barren, sabana de Motembo, Santa Clara (*Léon & Edmond* 8607)." Specimens from the same locality were transplanted in Vedado, Havana (*Léon & Edmond*'s no. 8682). Brother Léon explained in a letter that the description was drawn from both numbers. The plants found at Motembo (January 4, 1919) were without inflorescence but bloomed in May. A small plant of no. 8607 and well developed plants of no. 8682 were kindly sent to the United States National Herbarium by Brother Léon. The type specimens are preserved in the Colegio De La Salle Herbarium, Vedado, Havana.

DESCRIPTION

A low caespitose profusely stoloniferous perennial with short slender rhizomes; culms compressed, filiform, 2 to 6 cm. tall; stolons as much as 15 cm. long (probably longer), the short very slender joints ascending-pubescent, the foliage conspicuously spreading-pilose, the narrow flat blades 5 to 15 mm. long; leaves of the relatively few flowering culms crowded at the base; nodes ascending-pubescent; sheaths pilose, or the upper nearly glabrous; ligule about 1 mm.

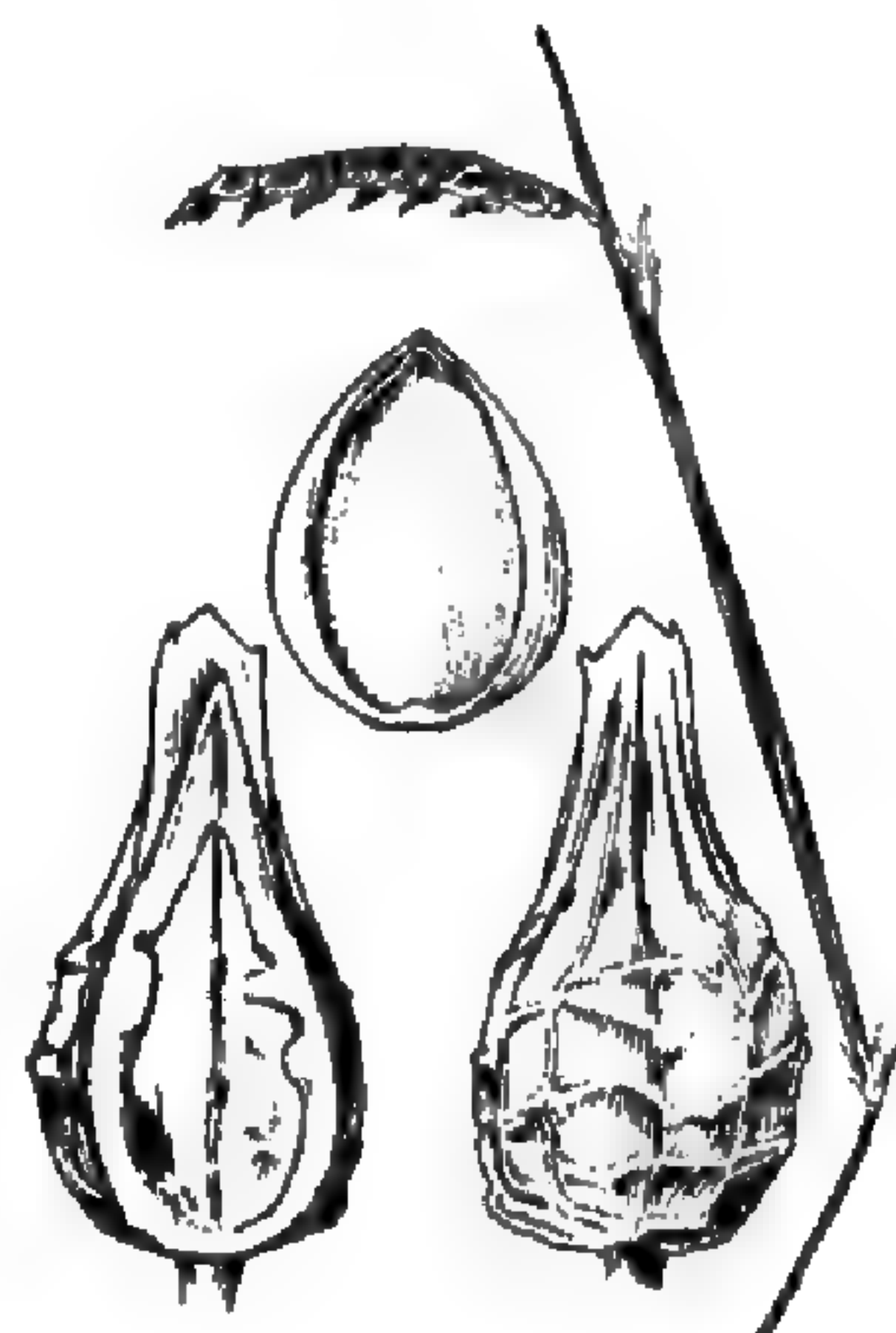


FIGURE 99.—*P. edmondi*.
From duplicate type

long; blades 1 to 6 cm. long, 1 to 2 mm. wide, sparsely pilose on the upper surface toward the base, rather thin, flat or subinvolute toward the tip; raceme solitary, 10 to 15 mm. long; rachis flat, 0.5 mm. wide, pilose at base; spikelets solitary, on slender pubescent pedicels, slightly imbricate, glabrous, 1.5 to 2 mm. long; about 1 mm. wide, broadly ovate with the apex prolonged into a prominent beak, glume 7-nerved, irregularly transversely wrinkled in the lower half, the wrinkles apparently smoothing out at maturity, narrowed above into a firm flat sometimes minutely toothed beak; sterile lemma nearly equaling the glume, long-pointed, except toward the apex deeply hollowed between the raised somewhat fluted margins; fruit 1.2 to 1.4 mm. long, about 1 mm. wide, ovate, subacute, minutely papillose, brown at maturity.

This striking species is known only from the type locality. Our fragment of *Léon & Edmond* 8607 consists of little tufts along a slender rhizome, the blades rather firm and subinvolute, obviously a dry-season phase. The spikelets of no. 8682 vary in size, the beak in some shorter and more pointed than shown in figure 99. In these smaller spikelets the glume is scarcely or not at all wrinkled.

DISTRIBUTION

Palm barrens on serpentine, Santa Clara, Cuba.

CUBA: Motembo, *Ekman* 16822; *Léon & Edmond* 8607, 8682.

Orbiculata.—Perennials, rooting and branching at the lower nodes; blades flat; racemes 2 to 4 (to 8 in *P. jimenezii*); spikelets solitary, depressed-biconvex or plano-convex, the midnerves commonly suppressed, the lateral nerves forming a narrow flat ring about the spikelet. Plants of low altitudes.

Spikelets suborbicular.

Blades 1 to 6 cm. long; spikelets 1 to 1.2 mm. long---99. *P. orbiculatum*.

Blades 5 to 13 cm. long; spikelets 1.7 to 1.8 mm. long--101. *P. hitchcockii*.

Spikelets not suborbicular, more or less elliptic.

Spikelets pubescent, blunt-----102. *P. reptatum*.

Spikelets glabrous or obscurely pubescent at base only, subacute.

Culms 10 to 30 cm. long; spikelets 1.3 to 1.5 mm. long.

100. *P. jimenezii*.

Culms 50 cm. long or more; spikelets 2.5 to 2.7 mm. long.

103. *P. ampicarpum*.

99. *Paspalum orbiculatum* Poir.

Paspalum orbiculatum Poir. in Lam. Encycl. 5: 32. 1804. "Ledru * * * de Porto-Ricco (V. s. in herb. Lam.)." The specimen in the Lamarck Herbarium in Paris bears the name in Poiret's script. There is a duplicate in the general Paris Herbarium and another in the Florence Herbarium. The latter bears the date 1798.

Paspalum pusillum Vent.; Flüge, Monogr. Pasp. 100. 1810. "Insula St. Thomae. Ventenat. Porto Rico. Ledru. Specimen mihi dono dedit defunctus Ventenat." Specimens of the Ventenat collection from St. Thomas were examined in the Willdenow and the Kunth herbaria in Berlin, in the Delessert Herbarium, and in the British Museum. The last bears a printed label "Type specimen,"³³ undoubtedly added at the British Museum. Flüge cites *Paspalum orbiculatum* Poir., but gives no reason for publishing a new name.

³³ See p. 1.

Paspalum serpens Presl; Trin. Gram. Pan. 102. 1826. "V. spp. Brasil. (N. ab. Esenb.)" The name is credited to "Presl. ined.," but this was probably an error for Nees. The specimen in the Trinius Herbarium is labeled "*Pasp. serpens* N. Es. Bras. Amazonas. ex hb. reg. monac." Nees publishes the species as his own,³⁴ citing "Habitat in ripis praeruptis Tapajoz fluvii et fluminis Amazonum prope Santarem provinciae Paraënsis." Nees' type in the Munich Herbarium (of which the Trinius specimen is doubtless a part), was collected by Martius.

Paspalum geniculatum Steud. Syn. Pl. Glum. 1: 18. 1854. Not *P. geniculatum* Raf. 1817. "Cayenne." The type, in the Paris Herbarium, bearing the name in Steudel's script, was collected by Leprieur.

Paspalum lenormandi Husn. Enum. Glum. 12. 1871. "No. 73 * * * Didier (Mart.[inique])." Specimens of this collection were examined in the Berlin, Brussels, and Montpellier herbaria.

DESCRIPTION

A low creeping perennial, with long leafy stolons and ascending flowering branches, often forming dense mats; culms 10 to 60 cm. long, decumbent and rooting at the nodes, the internodes short, very slender, compressed, glabrous,

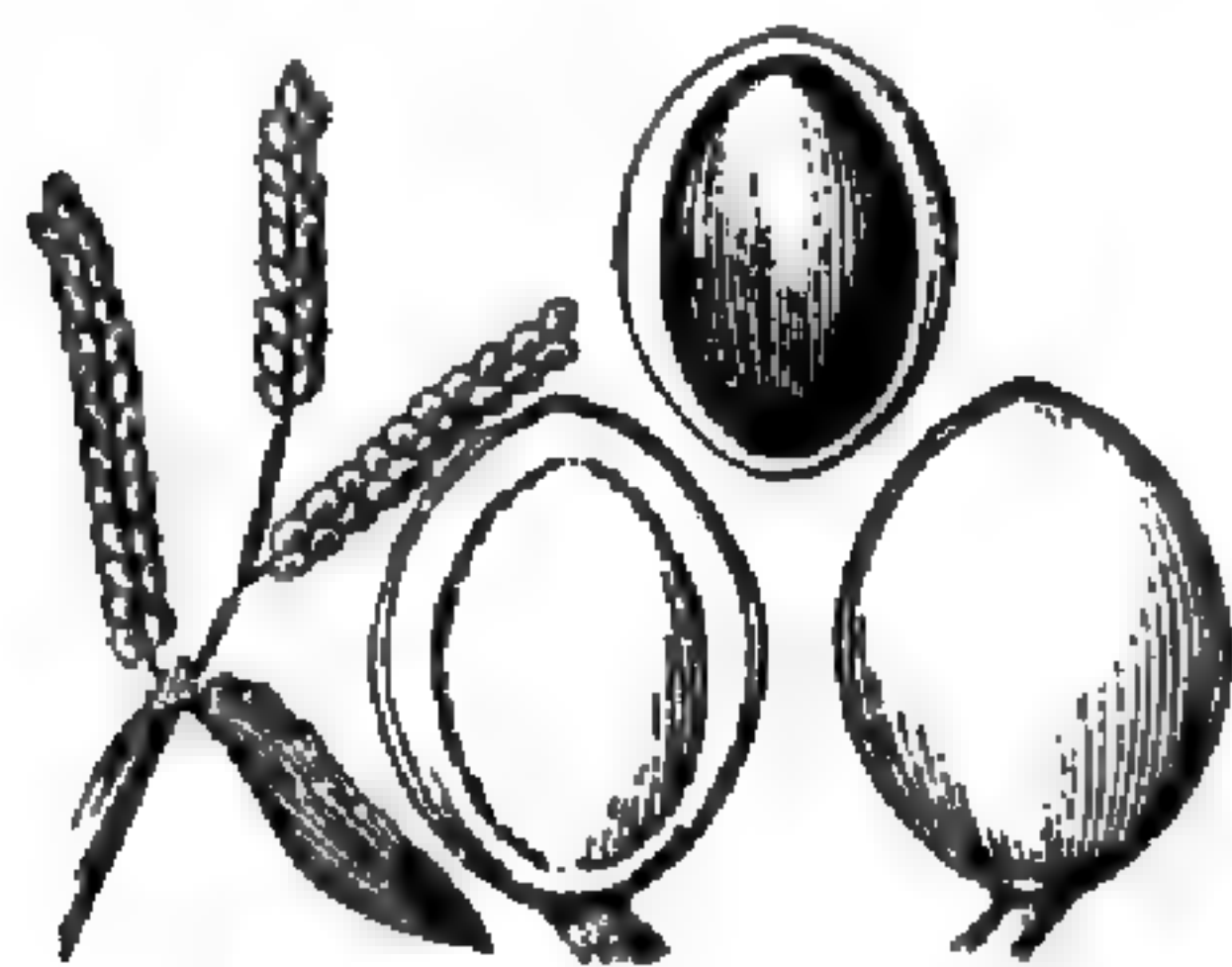


FIGURE 100.—*P. orbiculatum*.
From duplicate type in
Paris Herbarium

the flowering branches 5 to 20 cm. tall; nodes glabrous or appressed-pubescent; sheaths loose, compressed, ciliate at the summit, otherwise glabrous; blades flat, spreading, 1 to 6 cm. long, 1.5 to 7 mm. wide, abruptly narrowed at base into a minute petiole, usually with a ring of hairs back of the ligule, otherwise glabrous or minutely pubescent on the petiole and rarely on the lower surface; racemes 2 to 7, commonly 3 or 4, ascending or spreading, 0.6 to 2.3 cm. long, 1 to 10 mm. distant, on a slender narrowly winged axis, the peduncle included or short-exserted; rachis membranaceous, about 0.8 mm. wide, scabrous on the margin and with a few hairs at base; spikelets slightly or scarcely imbricate, 1 to 1.2 mm. long, about 0.9 mm. wide, depressed subhemispheric, greenish golden at maturity turning ruddy brown between the slightly raised pale margins, the flat pedicels sometimes bearing a few stiff hairs; glume and sterile lemma equal, 2-nerved, rarely obscurely 4-nerved, the mid-nerves suppressed, very thin in texture, glabrous or rarely pubescent; fruit 0.9 to 1 mm. long, at maturity reddish chestnut except the margins of the lemma, smooth and shining, the palea slightly convex.

The following specimens have spikelets obscurely to rather densely pubescent: *Deam* 6038, *Cook & Griggs* 431, *Pittier* 362, from Guatemala; *Pittier* 3426, Panama; *Rothenay* in 1844, French Guiana; *Burchell* 8864, *Goeldi* 207, *Kuhlmann* 3357, Brazil; and *Rojas* 3350, Paraguay.

DISTRIBUTION

Moist open ground, along streams and ditches, in savannas and old fields, mostly at low altitudes, southern Mexico and the West Indies to Paraguay.

VERA CRUZ: Minatitlán, *Smith* 562. Hacienda de Santa Barbara, *Liebmann* 153. Sanborn, *Orcutt* 3245.

GUATEMALA: San Tomás, *Deam* 6038. Finca Sepacuité, *Cook & Griggs* 431. Puerto Barrios, *Pittier* 362.

HONDURAS: Lancetilla Valley, *Standley* 53253, 56576. Puerto Sierra, *Wilson* 467.

EL SALVADOR: San Miguel, *Standley* 21108.

³⁴ Nees, *Agrost. Bras.* 50. 1829.

COSTA RICA: San José, *Pittier* 1183. Chemin de Carrillo, *Biolley* 3108. Port Limon, *Hitchcock* 8432.

PANAMA: Bocas del Toro, *Hart* 92. Fató, *Pittier* 4147. Canal Zone, *Hitchcock* 7966, 8389; *Pittier* 3426, 4613; *Standley* 30432.

CUBA: Guantánamo, *Ekman* 15806. Cajóbabó, *Léon* 12315.

PORTO RICO: Mayaguez, *Britton & Hess* 2835. Guaynabo, *Whetzel, Kern & Toro* in 1924. Pueblo Viejo, *Sintenis* 1229. San Juan, *Heller* 664. Cayey, *Chase* 6739. Sierra de Naguabo, *Britton & Cowell* 2186.

WINDWARD ISLANDS: Martinique, *Duss* 4507.

TRINIDAD: St. Joseph, *Amer. Gr. Nat. Herb.* 575. Oropuche Lagoon, *Britton, Hazen & Freeman* 1139.

COLOMBIA: Córdoba, *Pittier* 536.

VENEZUELA: Without locality, *Fendler* 2536.

BRITISH GUIANA: Georgetown, *Hitchcock* 16620. Coast lands, *Jenman* 6005, 6477. Tumatumari, *Hitchcock* 17341.

DUTCH GUIANA: "Surinam," *Weigelt* in 1827.

FRENCH GUIANA: Notaille, *Rothenay* in 1844.

BRAZIL: Marajó Island, *Goeldi* 85, 207. Rio Branco, *Kuhlmann* 3357. Rio Tocantin, *Burchell* 8864. Manáos, *Kuhlmann* 1680. Pernambuco, *Chase* 7736; *Pickel* 1358. Matto de São João, *Chase* 8142. São Leopoldo, *Dutra* in *Mus. Nac. Rio Jan.* 16496.

PARAGUAY: Carapeguá, *Rojas* 3350.

ECUADOR: Balao, *Eggers* 14668. Teresita, *Hitchcock* 20434. Milagro, *Hitchcock* 20202. Portovelo, *Hitchcock* 21257.

100. *Paspalum jimenezii* Chase, sp. nov.

DESCRIPTION

A slender perennial in small tufts or loose mats; culms 10 to 30 cm. long, decumbent at base, rooting and branching at the lower nodes, compressed, glabrous; nodes glabrous or sparsely appressed-pubescent, sheaths compressed, ciliate on the margin except toward the base, pubescent on the collar; ligule very minute; blades flat, ascending or spreading, 2.5 to 9 cm. long, 2 to 5 mm. wide (the uppermost reduced), rounded at base, the narrowed junction with the sheath puberulent within, the blade otherwise glabrous or with a few hairs on the margin at base; racemes 2 to 8, ascending or spreading, 1.5 to 4 cm. long, the common axis 0.5 to 2 cm. long, the peduncle included or short-exserted; rachis membranaceous, about 0.8 mm. wide, pubescent at base; spikelets not imbricate, 1.3 to 1.5 mm. long, 0.9 to 1 mm. wide, ovate-elliptic, subacute, greenish stramineous, the flat pedicels glabrous; glume and sterile lemma equal, pointed beyond the fruit, 2-nerved, the mid nerves suppressed, thin in texture, glabrous; fruit 1.1 to 1.3 mm. long, pale.

Type in the U. S. National Herbarium, no. 951752, collected along the margin of Río Bebedero, at Las Playitas, Guanacaste, Costa Rica, January 5, 1913, by Otón Jiménez (no. 742).

Known only from the type collection. Señor Otón Jiménez writes (translated), "This species is very common along the margin of Río Bebedero, in a place called Las Playitas belonging to the Faboga ranch, but the area of distribution is restricted. There is in Las Playitas a region 300 meters long by 50 wide in which there is no other vegetation than this *paspalum*. The general aspect is similar

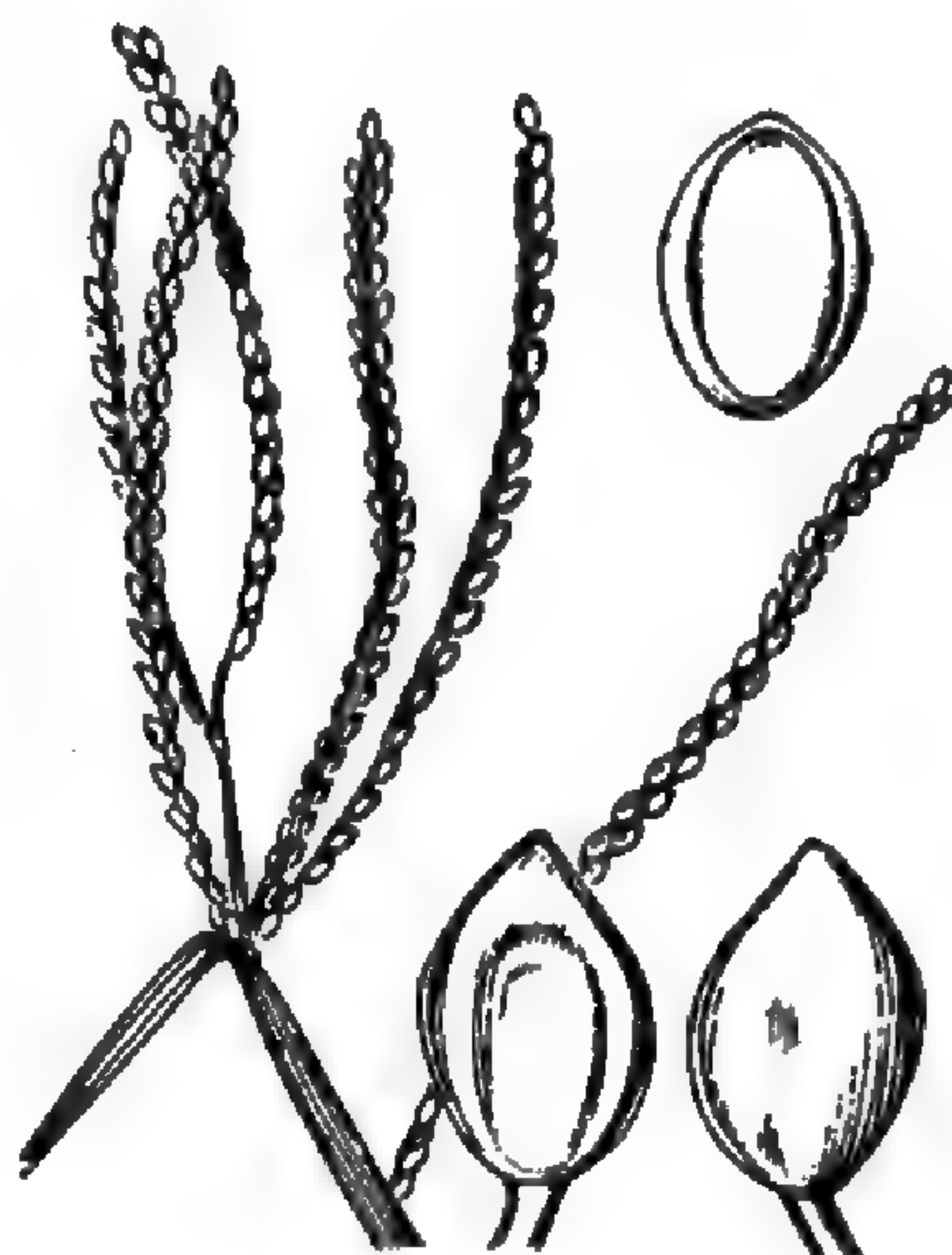


FIGURE 101.—*P. jimenezii*. From type specimen

to that of *Cynodon dactylon*. I did not see this species elsewhere in a distance of 20 kilometers explored in the vicinity of Bebedero. This species is frequently found growing with *Panicum laxum* Swartz."



FIGURE 102.—*P. hitchcockii*. From type specimen

101. *Paspalum hitchcockii* Chase, sp. nov.

DESCRIPTION

A glabrous creeping subaquatic perennial with ascending flowering branches sometimes forming extensive colonies; culms 30 to 50 cm. or more long (5 to 10 cm. in dwarf plants), decumbent and rooting at the nodes, the internodes rather short, relatively stout, compressed, the flowering branches 12 to 30 cm. tall, repeatedly branching; nodes glabrous or sparsely appressed-pubescent; sheaths loose, compressed, rarely with a few hairs at the truncate summit; ligule very minute; blades flat, ascending to spreading, 5 to 13 cm. long, 4 to 9 mm. wide, rounded

at base, the junction with the sheath sparsely puberulent within; racemes 2 or 3, ascending, relatively thick, 1.5 to 4 cm. long, the common axis 2 to 10 mm. long, narrowly winged, the peduncle usually included in the somewhat inflated sheath; rachis membranaceous, 1.2 to 1.5 mm. wide, sometimes minutely pubescent at base; spikelets mostly imbricate, 1.7 to 1.8 mm. long, about 1.5 mm. wide, depressed-hemispheric, light-olivaceous, the pedicels flat; glume and sterile lemma equal, 2 to 4 nerved, the mid nerves suppressed or developed in terminal spikelets, loose and irregularly wrinkled, very thin and fragile, commonly showing holes toward maturity; fruit about 1.6 mm. long, reddish brown, smooth and shining, very minutely whitish puberulent around the summit, especially of the palea.

Type in the U. S. National Herbarium, no. 951763, collected along a pool in mud or shallow water, east of Cartagena, Colombia, November 20, 1912, by A. S. Hitchcock (no. 9914).

In the type specimen one of the terminal racemes is double, two rachises being grown together back to back, each with a single row of spikelets. This teratological form has not been observed elsewhere in the genus.

Pittier's no. 4632 consists of dwarf plants.

DISTRIBUTION

Margins of lagoons and ponds, at low altitudes, Panama and Colombia.

PANAMA: Chepo, Pittier 4632.

COLOMBIA: Cartagena, Hitchcock 9914.

102. *Paspalum reptatum* Hitchc. & Chase

Paspalum reptatum Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 318. 1917. "Type in the U. S. National Herbarium, no. 865563, collected in wet ground in savannas west of Manacas, Province of Santa Clara, Cuba, by Brother Léon and F. R. Cazanias, December 28, 1915 (no. 5850)."

DESCRIPTION

A creeping subaquatic perennial with ascending flowering branches and cleistogamous spikelets borne in minute sheaths at the very base; culms 30 to

100 cm. or more long, decumbent and rooting at the nodes, the internodes sometimes as much as 10 cm. long, commonly shorter, slender, compressed, glabrous, the flowering branches 10 to 40 cm. long, commonly repeatedly branching; nodes glabrous or minutely appressed-pubescent; sheaths loose, commonly separating from the culm, compressed, the lower mostly velvety-pubescent, the upper usually glabrous; ligule minute; blades flat, spreading, 3 to 10 cm. long, 2 to 5 mm. wide, velvety-pubescent to glabrous; racemes 2 or 3, commonly overtopped by the upper leaf, divergent or reflexed, 1 to 4 cm. long, 5 to 10 mm. distant on a slender flattened axis; rachis pubescent at the base; spikelets not imbricate, 1.5 to 1.7 mm. long, 1.2 mm. wide, elliptic-obovate, blunt; glume and sterile lemma equal, 3-nerved, the mid nerve often suppressed in the glume, frequently also in the lemma, finely pubescent, yellowish-green, blotched with brown; fruit 1.4 to 1.5 mm. long, at maturity reddish-brown, shining, the margins of the lemma lighter in color, very obscurely and minutely puberulent around the summit.

The cleistogamous spikelets are mostly somewhat distorted by pressure, but similar in size and shape to those of the racemes. They are very inconspicuous, solitary, partly inclosed in minute sheaths at the primary base, rarely at the rooting and branching nodes.

DISTRIBUTION

In mud or shallow water, margins of ponds and depressions in savannas, Cuba and Jamaica.

CUBA: Pinar del Río, *Ekman* 18249. Manacas, *Léon & Cazan* 5850. Jagüey Chico, *Ekman* 16983.

JAMAICA: Inverness, *Harris* 12717.

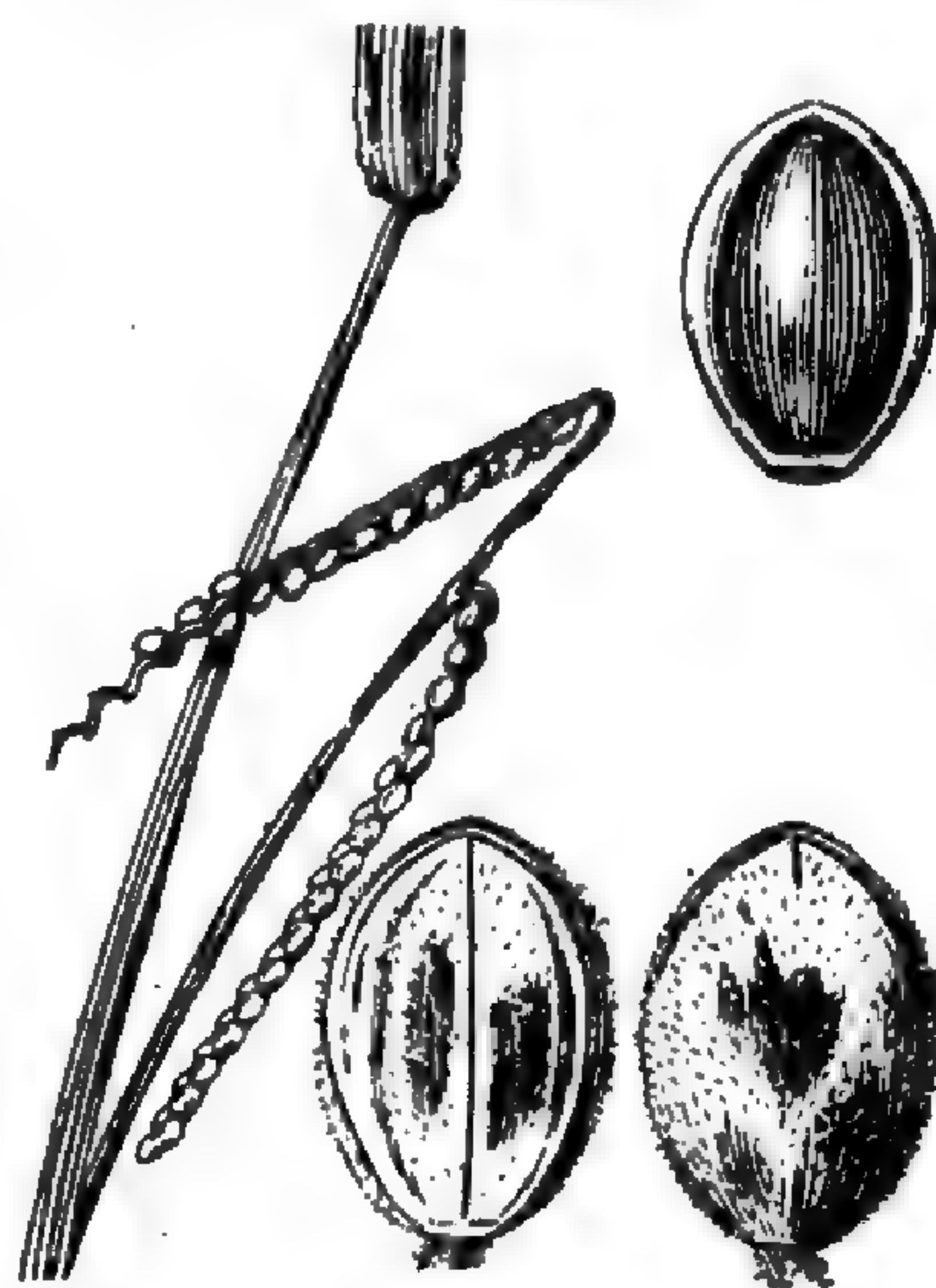


FIGURE 103.—*P. reptatum*. From type specimen

103. *Paspalum amphicarpum* Ekman, sp. nov.

DESCRIPTION

A glabrous widely creeping aquatic or subaquatic perennial with ascending flowering branches and solitary cleistogamous spikelets borne on short subterranean branches from the base or from rooting nodes; culms 50 to 75 cm. or more long, decumbent and rooting at the nodes, the internodes 2 to 8 cm. long, compressed, relatively stout, wiry, glabrous, the flowering branches 30 to 40 cm. long, simple or sparingly branching; nodes appressed-pubescent or the upper glabrous; sheaths loose, strongly keeled, ciliate toward the summit, sometimes pubescent on the collar; ligule nearly obsolete; blades folded at base, flat above, spreading, 5 to 15 cm. long, 3 to 6 mm. wide (the uppermost reduced), the base as wide as the summit of the sheath, the junction densely appressed-pubescent within; racemes 2 or 3, divergent, 2 to 4.5 cm. long, 4 to 15 mm. distant on a very narrowly winged axis, the peduncle short-exserted or included; rachis membranaceous, about 0.8 mm. wide, densely short-pubescent at the very base; spikelets mostly rather distant, 2.5 to 2.7 mm. long, 1.4 to 1.5 mm. wide, elliptic, subacute, green, lightly blotched with brown, the pedicels flat; glume and sterile lemma equal, pointed beyond the fruit, 2-nerved, the mid nerves suppressed or rarely developed, the glume minutely pubescent on either side at the base; fruit about 2.2 mm. long, brownish, smooth and shining, under a lens showing very minute pubescence of thickish white hairs toward the summit; subterranean spikelets solitary, 4 to 5 mm. long, about 2 mm. wide, pointed; glume and sterile lemma

3 to 5 nerved, the glume pubescent on either side at base; fruit 3 to 3.2 mm. long, plump, reddish-brown, smooth and shining, the minute pubescence denser than in the fruit of the aerial spikelets, appearing like a whitish bloom, especially toward the summit of the palea.

Type in the U. S. National Herbarium, no. 1,296,159, collected at the edge of a pool near Laguna de Piedras, Pueblo Nuevo, Mangas, Province of Pinar del Rio, Cuba, October 8, 1923, by Dr. E. L. Ekman (no. 17565).

"On land this species looks like the specimens sent [as described above] and flowers, albeit never abundantly; in water it has floating elongated leaves and never flowers."—Note by Doctor Ekman.

This is the only known species of *Paspalum* in which subterranean cleistogenes are produced, as in the genus *Amphicarpon*. The spikelets of the aerial racemes are immature. The spikelets and fruit are probably darker brown at maturity

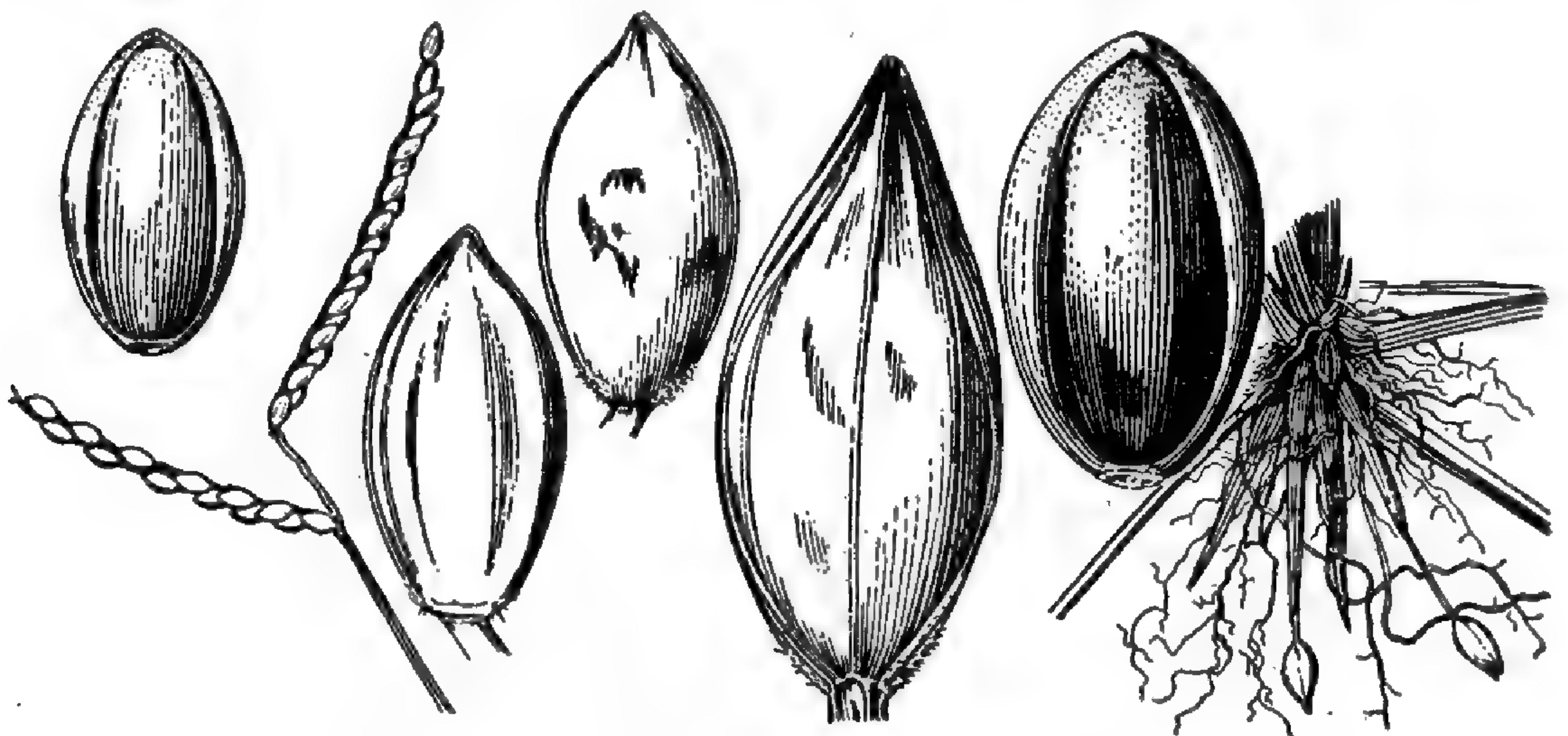


FIGURE 104.—*P. amphicarpum*. From type specimen

Represented in the United States National Herbarium by the type collection only. Doctor Ekman writes, "As yet only known from Pinar del Río, from Mangas to Tacotaco, but will undoubtedly also be found in Habana and Matanzas along the south coast."

Conjugata.—Creeping stoloniferous perennials, with flat lax blades and two slender, yellow racemes, paired, or rarely a third below.

Racemes rarely more than 12 cm. long; spikelets 1.4 to 1.8 mm. long.

104. *P. conjugatum*.

Racemes usually more than 12 cm. long; spikelets mostly 2 mm. long.

104a. *P. conjugatum pubescens*.

104. *Paspalum conjugatum* Bergius

Paspalum conjugatum Bergius, Act. Helv. Phys. Math. 7: 129. pl. 8. 1762. "Habitat in Surinamo." The type has not been examined, but the plate identifies the species. The description fails to note the ciliate margin of the spikelets.

Paspalum tenue Gaertn. f. Fruct. & Sem. 2: 2. pl. 80. 1791. *P. conjugatum* Bergius is cited as synonym. The figure of the spikelet shows the ciliate margin.

Paspalum ciliatum Lam. Tabl. Encycl. 1: 175. 1791. "Ex America calidiore. Comm. D. Richard." The type, in the Lamarck Herbarium in Paris, bearing the name in Lamarck's script, is a single flowering culm. An attached slip reads "de Cayenne, Leblond."

Paspalum africanum Poir. in Lam. Encycl. Suppl. 4: 314. 1816. "Recueillie en Afrique par M. de Beauvois." The type has not been located. Stapf³⁵ refers this to *P. conjugatum* and the description applies fairly well to it. In the Delessert Herbarium is a specimen of *P. conjugatum* collected by Beauvois in Oware, Africa, and named by him *P. ciliatum* Lam.

Paspalum renggeri Steud. Syn. Pl. Glum. 1: 17. 1854. "Paraguay (legit beat. Rengger, communicavit Fleischer.)" The type, in the Paris Herbarium, bearing the name in Steudel's script, has sparsely pubescent blades and spikelets 1.5 mm. long.

Paspalum sieberianum Steud. Syn. Pl. Glum. 1: 17. 1854. "*P. conjugatum* Sieb. Agr. nr. 127. N. Holl." In the Dumond d'Urville Herbarium in Caen is a specimen of Sieber's no. 127 named "*Sieberianum* Steud." in Steudel's script. It consists of two flowering culms of *P. conjugatum*, each with a pair of terminal racemes and a third raceme 10 and 15 cm. below. This exceptional inflorescence agrees exactly with Steudel's description.

Paspalum longissimum Hochst.; Steud. Syn. Pl. Glum. 1: 19. 1854. "Hrbr. Kappler nr. 1556 * * * Surinam." Specimens of this collection were examined in the Leipzig, Delessert, and Drake herbaria. Those in the Leipzig and Drake herbaria have a third raceme below the pair. The spikelets are 1.7 mm. long.

Paspalum bicrurum Salzm.; Doell in Mart. Fl. Bras. 2²: 55, 1877, as synonym of *P. conjugatum*. Salzmann specimens from Bahia, Brazil, bearing this name, were examined in several herbaria. Those in Delessert, Drake, and Caen, and part of that in Kew are *P. conjugatum*. Part of the Kew specimen and two specimens from Montpellier have pubescent blades and spikelets 1.8 to 2 mm. long and belong to the variety *pubescens*.

Paspalum conjugatum var. *parviflorum* Doell in Mart. Fl. Bras. 2²: 55. 1877. "Manãos prov. do Alto Amazonas: (Spruce n. 894, *Paspalum* 23); * * * provinciae Piauiensis (Gardner n. 3502)." Spruce's no. 894 in the Munich Herbarium, bearing the name in Doell's script, has spikelets 1.5 to 1.6 mm. long, and sparsely pubescent blades. Gardner's no. 3502 in the Brussels Herbarium is the same form. The varietal name is crossed out and "D" signed below by Doell.

Paspalum conjugatum var. *tristachyum* Vandery. Bull. Agric. Congo Belge 9: 245. 1918. "Bas-Kasai: Dima; région du Moyen-Kwilu: Kikwit." Africa. A specimen collected by Father Vanderyst in Dima, in 1915, and bearing the name in his writing was kindly sent by him to the United States National Herbarium. This has three racemes.

Stapf³⁶ refers *Digitaria conjugata* Schult. to *Paspalum conjugatum*, but that name is based on *Panicum conjugatum* Roxb.,³⁷ which was described from Coromandel, India. From the description it is obvious that this is not *Paspalum conjugatum* but some species related to *Panicum distachyum* L., now referred to *Brachiaria distachya* (L.) A. Camus.

DESCRIPTION

An extensively creeping perennial, with long leafy stolons and ascending to suberect flowering branches, frequently purplish below, commonly forming a dense cover; culms as much as 2 meters long, rooting at the nodes, the internodes 1 to 15 cm. long, compressed, wiry, glabrous, the flowering branches commonly 20 to 50 cm. tall, sometimes 1 meter or more tall, simple or sparingly

³⁵ Fl. Trop. Afr. 9: 570. 1919.

³⁶ Fl. Trop. Afr. 9: 570. 1919.

³⁷ Fl. Ind. 1: 291. 1820.



FIGURE 105.—*P conjugatum*. From Baker 90

branching; nodes pubescent or glabrous, those of the stolons usually conspicuously pilose; sheaths loose, compressed, ciliate on the margin, often pubescent on the collar, otherwise glabrous, those of the stolons short and broad; ligule 1 to 1.5 mm. long; blades flat, spreading, rather thin, 5 to 22 cm., commonly 8 to 12 cm., long, 5 to 15 mm. wide, slightly narrowed to the base, usually with a tuft of long hairs at the very base, the margin scabrous to short-ciliate, otherwise glabrous or sparsely papillose-pubescent on the upper or on both surfaces; racemes 2, paired or nearly so, rarely a third below, widely divaricate, often arcuate, slender, 4 to 15 cm., commonly 8 to 12 cm., long; rachis narrowly winged, about 0.8 mm. wide, densely pubescent at the base; spikelets solitary, imbricate, 1.4 to 1.8 mm. long, 1 to 1.2 mm. wide, flattened concavo-convex, ovate, subacute to abruptly apiculate, pale yellow, the pedicels flat; glume and sterile lemma equal, very thin and closely appressed to the fruit, 2-nerved, the mid nerves suppressed, the nerves of the glume papillose-ciliate with long fine hairs, forming a delicately fringed margin to the spikelet, both otherwise glabrous; fruit about 1.5 mm. long, pale, not strongly indurate.

DISTRIBUTION

A common weed in cultivated and waste ground, along ditches and roadsides throughout the Tropics from sea-level to about 1,500 meters, extending north into the southern United States and south to Argentina; less common in the Eastern Hemisphere, probably native of America. It is not grazed by stock when other forage is available; called "sour grass" in the British West Indies.

FLORIDA: Tampa, *Hitchcock* 948. Hillsborough County, *Fredholm* 6356, 6473.

Alva, *Francis* 5. Paradise Key, *Mosier* 153.

ALABAMA: Mobile, *Mohr* in 1885.

LOUISIANA: Baton Rouge, *Joor* 18 in 1885. New Orleans, *Cocks* 418. Pointe-a-la-Hache, *Langlois* 25. Avery Island, *Hitchcock* 19864. Without locality, *Hale*.

TEXAS: Brownsville, *Hitchcock* 5408.

TAMAULIPAS: Victoria, *Palmer* 419 in 1907.

SAN LUIS POTOSÍ: Las Canoas, *Pringle* 3129.

SINALOA: Culiacán, *Palmer* 1549 in 1891.

JALISCO: Tequila, *Palmer* 367 in 1886.

VERA CRUZ: Jalapa, *Hitchcock* 6609. Córdoba, *Bourgeau* 1659; *Hitchcock* 6407; *Kerber* 49. Mirador, *Liebmann* 160. Pital, *Liebmann* 158. Zacuapan, *Purpus* 2158. Minatitlán, *Smith* 573. Motzorongo, *Smith* 631. Sanborn, *Orcutt* 3248.

MORELOS: Cuernavaca, *Hitchcock* 6818; *Pringle* 6215.

MICHOACÁN: Coahuayula, *Emrick* 48.

COLIMA: Manzanillo, *Hitchcock* 7030. Colima, *Palmer* 16 in 1897, 1272 in 1891. Paso del Río, *Emrick* 193.

OAXACA: Tecomanaca, *Conzatti* 4042 $\frac{3}{4}$. Tomellín, *Hitchcock* 6222; *Rose, Painter & Rose* 10050.

GUATEMALA: Sepacuité, *Collins & Goll* 05; *Cook & Doyle* 324. Chamá, *Johnson* 260; *Popenoe* 893. Finca Mocca, *Johnson* 115. Quiriguá, *Blake* 7706; *Holway* 594; *Standley* 23885. Gualan, *Blake* 7674. Quebradas, *Pittier* 8505. Puerto Barrios, *Standley* 24724. San Pablo, *Salas* 4. Escuintla, *Hitchcock* 9006; *Seler* 2576. Ojo de Agua, *Heyde & Lux (Dist. Smith)* 3902. Ciudad Vieja, *Tejada* 344.

HONDURAS: Lancetilla Valley, *Standley* 53315. San Pedro Sula, *Thieme* 374, (*Dist. Smith*) 5592. Ruatan Island, *Gaumer* in 1886. Bonacca Island, *Gaumer* in 1887.

EL SALVADOR: San Salvador, *Velasco* 7. Ahuachapán, *Standley* 19825.

NICARAGUA: Chinandega, *Baker* 2012.

- COSTA RICA: Río Bebedero, *Jiménez* 739. Alajuelita, *Tonduz* 8828. San José, *Pittier* 3009, *Tonduz* 758. Tuís, *Tonduz* 11402. General, *Tonduz* 3364. Cañas Gordas, *Pittier* 7354. Puerto Viejo, *Biolley* 7470. Carrillo, *Pittier* 3109. Buenos Aires, *Tonduz* 4862. Mole de San Rafael, *Pittier* 2601. Los Conventillos, *Tonduz* 2860.
- PANAMA: El Boquete, *Hitchcock* 8193. Bocas del Toro, *Carleton* 171. Porto Bello, *Pittier* 2444, 2480. Río Indio de Fató, *Pittier* 4260. Canal Zone, *Hitchcock* 7909; *Maxon* 6516; *Pittier* 2084, 3435, 3436; *Standley* 25651, 26463, 28584, 30063. Puerta Obaldía, *Pittier* 4314.
- BERMUDA: Paget, *Collins* 157.
- BAHAMAS: Nassau, *Curtiss* 192.
- CUBA: Mariel, *Ekman* in *Amer. Gr. Nat. Herb.* 960. Santiago de los Baños, *Léon* 4430; *Palmer & Riley* 541. Los Palacios, *Shafer* 11804. Herradura, *Hitchcock* 474. Buenaventura, *Wilson* 9404. Bejucal, *Liebmann* 161. Habana, *Léon* 939b, 939c, 1984; *Wilson* 1277. Santiago de las Vegas, *Baker* 90; *Baker & Wilson* 543; *Hitchcock* 473; *Léon* 782; *Wilson* 1006. Arroyo Apolo, *Léon* 302. Guanimar, *Léon* 5075. Hanábana, *Wright* 767. Guines, *Léon* 938. Sancti Spíritus, *Léon* 938c. Santiago de Cuba, *Léon* 938d. Gran Piedra, *Shafer* 9025. Bayale, *Ekman* 10370.
- JAMAICA: Montego Bay, *Hitchcock* 9688. Ipswich, *Hitchcock* 9629. Troy, *Harris* 12611; *Hitchcock* 9797. Savoy, *Harris* 11640. Ewarton, *Hitchcock* 9433. Bog Walk, *Hitchcock* in 1890. Hope Garden, *Harris* 11448, 12282. Cinchona, *Harris* 11308; *Hart* 755. Constant Spring, *Hitchcock* 9260. Bath, *Maxon* 2363; *Nichols* 202. Mill Bank, *Maxon & Killip* 138. Port Antonio, *Fredholm* 3306.
- HAITI: Marmelade, *Leonard* 8204. St. Michel, *Leonard* 7731. Gonave Island, *Leonard* 5187. Port-au-Prince, *Buch* 1591; *Ekman* 8040; *Leonard* 3425. Pétionville, *Leonard* 4871, 5062. Mission, *Leonard* 3711. Fond Parisien, *Leonard* 4183. Mirabalais, *Cook, Scofield & Doyle* 80. Plaisance, *Cook, Scofield & Doyle* 180.
- DOMINICAN REPUBLIC: Haina, *Faris* 101. Río Gurabito, *Eggers* 1964. Sánchez, *Abbott* 70, 83, 204.
- PORTO RICO: Mayaguez, *Britton & Hess* 2833; *Chase* 6152; *Heller* 4397; *Sintenis* 99; *Underwood & Griggs* 175. Bayamon, *Chase* 6389. Pueblo Vieja, *Chase* 6404. Río Piedras, *Johnston* 381; *Stevenson* 3219. Sierra de Luquillo, *Chase* 6722; *Wilson* 159.
- VIRGIN ISLANDS: St. Thomas, *Eggers* in 1881; *Hitchcock* 16306. St. Croix, *Hitchcock* 16341; *Ricksecker* 223; *Thompson* 26.
- LEEWARD ISLANDS: St. Christopher, *Hitchcock* 16350, 16365. Antigua, *Hitchcock* 16390. Dominica, *Hitchcock* 16424; *Jones* 16, 24.
- WINDWARD ISLANDS: Montserrat, *Shafer* 38. Martinique, *Duss* 1276; *Hitchcock* 16443. Barbados, *Bot. Station Herb.* 269. St. Lucia, *Brooks* 34; *Glasgow* 3; *Hitchcock* 16484; *Kemp* 19½, 32, 42½. Grenada, *Broadway* 19; *Hitchcock* 17664.
- TRINIDAD: St. Ann, *Britton & Hazen* 1685. Port of Spain, *Hitchcock* 9952. Caura River Valley, *Britton & Hazen* 1201. Without locality, *Sieber* 366.
- TOBAGO: Scarboro, *Broadway* 4361; *Hitchcock* 10228.
- COLOMBIA: Santa Marta, *Smith* 178. Buenaventura, *Hitchcock* 19897. Calí, *Pittier* 640. Córdoba, *Pittier* 537. Río Frío, *Pittier* 1581. Tierra Alta, *Pennell* 4689, Medellín, *Toro* 38. Vuelta de Acuña, *Pennell* 3797. Puerto Wilches, *Killip & Smith* 14755. Libano, *Pennell* 3213. Quetame, *Pennell* 1748. Nalgaima, *Rusby & Pennell* 1177. La Cumbre, *Pennell* 5011. Popayán, *Lehmann* 8543.

- VENEZUELA: Bobures, *Jahn* 347, 349. Carayaca, *Jahn* 307. Tovar, *Fendler* 1725. Guaremales, *Pittier* 9098. Albacoa, *Curran & Haman* 1040. Caracas, *Bailey* 358; *Pittier* 6166. Island of Margarita, *Johnston* 198; *Miller & Johnston* 178. Cristóbal Colón, *Broadway* 523. Ciudad Bolívar, *Bailey* 1314. Santa Catalina, *Rusby & Squires* 359.
- BRITISH GUIANA: Waini River, *Gleason* 3673. Georgetown, *Hitchcock* 16613. Coast region, *Jenman* 3967.
- DUTCH GUIANA: Paramaribo, *Kuyper* in 1913; *Samuels* in 1916.
- FRENCH GUIANA: Cayenne, *Broadway* 132, 425.
- BRAZIL: Obidos, *Rodrigues (Jard. Bot. Rio Jan.)* 5413. Marajó, *Goeldi* 249. Pará, *Goeldi* 33, 73. Ceara, *Allemão* 1652. Bahia, *Chase* 8055; *Dorsett & Popenoe* 446b; *Glocker* 201. Rio Condas, *Curran* 189. Franklin Sampaio, *Dorsett* 215b. Rio de Janeiro, *Bailey* 371; *Gardner* 208; *Glaziou* 6957, 9055, 17366; *Holway* 1418, 1476. Jacarepaguá, *Chase* 8409. Itereré, *Sampaio* 2919. Sorocaba, *Mosén* 3005. Guaratuba, *Dusén* 13539. Porto Alegre, *Malme* in 1902.
- PARAGUAY: Between Río Apa and Río Aquidaban, *Fiebrig* 4652, 4696. Sierra de Amambay, *Hassler* 10015, 12088. Central Paraguay, *Morong* 247.
- ECUADOR: Balao, *Eggers* 14646. Guayaquil, *Mille* 304. Milagro, *Hitchcock* 20161, 20599. Tenguel, *Holmgren* 58. Galápagos Islands, *Stewart* 1312, 1313, 1314, 1316.
- PERU: Callao, *Wilkes Expl. Exped.* Chosica, *Macbride* 2878; *Macbride & Featherstone* 506. Colonia Perené, *Hitchcock* 22089. Muña, *Macbride* 4057. Without locality, *Lechler* 2275.
- BOLIVIA: Rurrenabaque, *Cárdenas (Mulford Biol. Expl.)* 1175. Buena Vista, *Steinbach* 5160. Río Surutú, *Steinbach* 6836. Mapiri, *Buchtien* 69, 1162. Hacienda Simaco, *Buchtien* 5325. Coroico, *Buchtien* 2504a. La Florida, *Hitchcock* 22633. Antahuacana, *Buchtien* 2504. Villamontes, *Pflanz* 2007.
- ARGENTINA: Posadas, *Ekman* 570, 571. Formosa, *Jørgensen* 2424.
- HAWAIIAN ISLANDS: Oahu, Honolulu, *Hitchcock* 13729, 14067. Nuuanu Valley, *Forbes* in 1908. Makiki, *Heller* 1975. Hauula, *Farmer* in 1895. Hawaii, Paauhau, *Rock* in 1909. Hilo, *Hitchcock* 14182; *Newell* in 1917. Without locality, *Hillebrand* 492.
- AFRICA: Gold Coast, *Howes* 907. Nigeria, *Jeffreys* 31. Sierra Leone, *Thomas* in 1915. Angola, *Gossweiler* 9068. Kamerun, *Zenker* 269. Mauritius, *Vaughan* A 4.
- INDIA: Bengal, *Nusker* 1227. Khasia, *Clarke* 18499. Ceylon, *Alston* 268; *Venning* in 1916.
- MALAY PENINSULA: Selangor, *Ridley* in 1914. Pahang, *Henderson* 17944. Malacca, *Bot. Gard. Singapore* 1324. Singapore, *Debeaux* in 1860. Lingga, *Bünnemeyer* 7398.
- SUMATRA: Fort de Kock, *Bünnemeyer* 1320. Bérastagi, *Fairchild & Dorsett* in 1926; *Yates* 509. Habinsaran, *Bartlett* 7944. Rumpit, *Fairchild & Dorsett* in 1926. Mt. Singgalang, *Fairchild & Dorsett* 688. Banka, *Bünnemeyer* 1394, 2246; *Tuxen* in 1921.
- JAVA: Pasoeroean, *Backer* 23079b.
- CHINA: Canton, *Hitchcock* 18681; *Levine* 1237. Hongkong, *Hitchcock* 18635. Island of Hainan, *Hitchcock* 19656.
- FORMOSA: Taihoku, *Sasaki* 21418.
- INDO-CHINA: Haiphong, *Hitchcock* 19526. Vinh, *Hitchcock* 19289. Hue, *Eberhardt* 2191; *Hitchcock* 19303. Cambodia, *Godefroy* in 1875; *Jullien* in 1874. Cochinchina, *Germain* in 1880. Iles de Poulo-Condor, *Harmand* 859.
- BORNEO: Sandakan, *Ramos* 1700.

PHILIPPINE ISLANDS: Luzon, *Elmer* 16497, 18184; *Hitchcock* 18030; *Loher* 1745; *Mearns* B. S. ³⁸ 2981; *McGregor* 61, B. S. 2333; *Merrill* 34, 122, 1137, (*Kneucker Gram.*) 607; *Romas* B. S. 1385, B.S. 8224; *Santos* 29; *Serviñas* B. S. 16878. Polillo, *McGregor* B. S. 10426; *Robinson* B. S. 9294. Batan, *Robinson* B. S. 6249. Mindanao, *Fernandez* B. S. 24382; *Robinson* B. S. 9973; *Weber* 1013; *Williams* 2377. Basilan, *De Vore & Hoover* 50. Palawan, *Ledesma* in 1913. MARIANNE ISLANDS: Guam, *Thompson* 294. AMBOINA: *Robinson* 1653. CAROLINE ISLANDS: Yap, *Volken* 110. NEW GUINEA: "Bisiat-abu, Papua," *White* 285. ARU ISLANDS: Batavia, *Saviniere* 164. SAMOA: Tutuila, *Setchell* 506a, 550. SOCIETY ISLANDS: Tahiti, *Setchell & Parks* 84.

104a. *Paspalum conjugatum pubescens* Doell

Paspalum conjugatum var. *pubescens* Doell in Mart. Fl. Bras. 2²: 55. 1877. "Prope Bahia (Martius), in civitate Paraguay (Rengger) et in Guiana gallica (ex cl. L. Cl. Richard)." Differentiated only by "Foliis pubescentibus." The Martius specimen in the Munich Herbarium, bearing the name in Doell's script, has pubescent blades and spikelets 1.7 to 1.8 mm. long. A specimen in the Paris Herbarium, labeled "Guiana Gall. ex Richard," with the varietal name in Richard's script and "*conjugatum*" added in Doell's script, has pubescent blades and spikelets 1.8 mm. long.

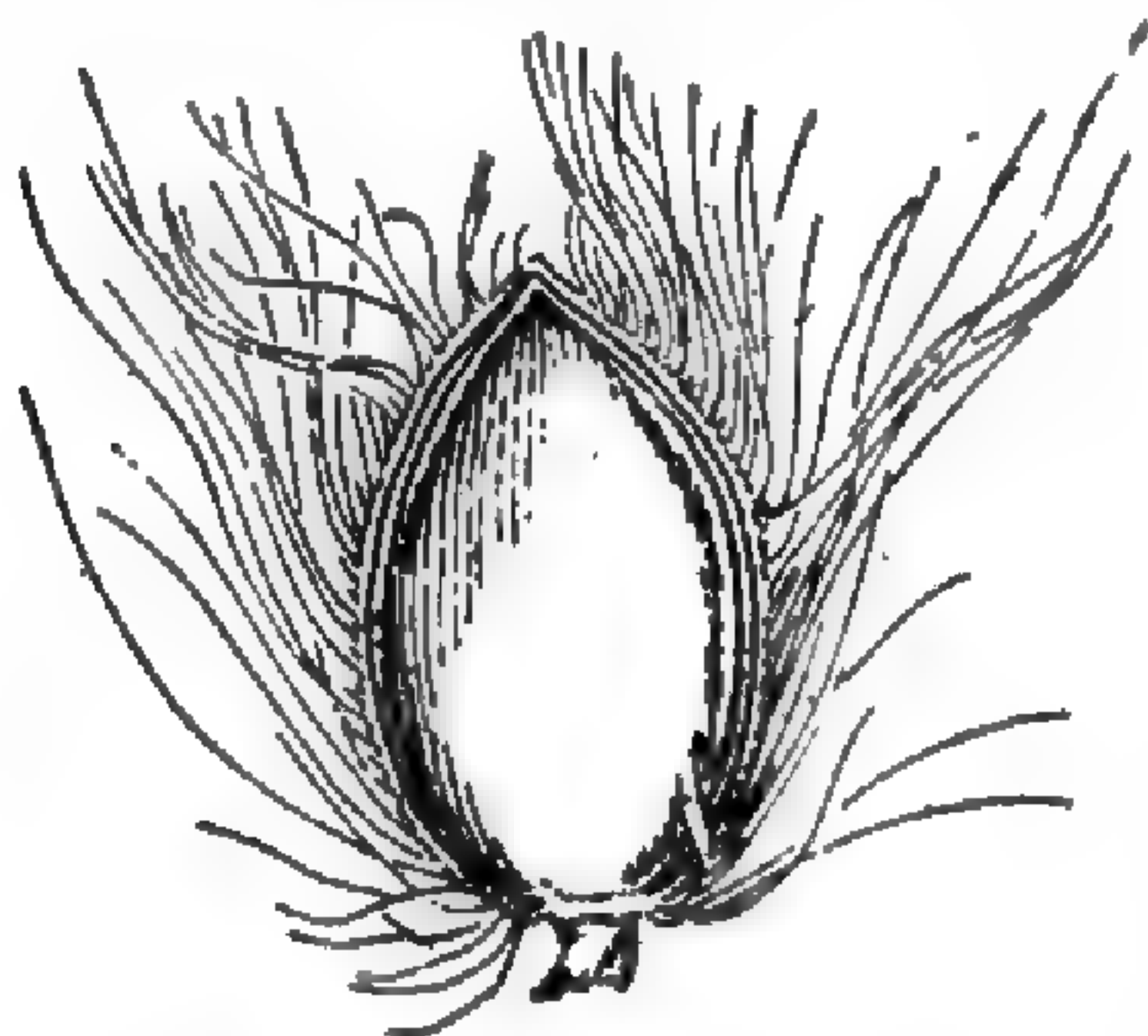


FIGURE 106.—*P. conjugatum pubescens*. From Calderón 945

DESCRIPTION

On the average coarser than the species, the blades commonly 15 to 20 cm., occasionally 25 cm., long, usually papillose-pubescent on both surfaces; racemes commonly 10 to 15 and occasionally as much as 20 cm. long; spikelets 1.7 to 2.2 mm. long, rather more copiously ciliate than usual in the species.

Plants with elongate racemes and spikelets at least 2 mm. long differ sufficiently in aspect to warrant subspecific rank, but about 40 per cent as many intermediates, with spikelets 1.7 to 1.9 mm. long, some of them with shorter racemes, render the distinction dubious. Both the specimens named by Doell, mentioned above, are of this intermediate group. A subspecies can not be differentiated on the pubescence of the blades, because fully 30 per cent of the specimens of the species itself, with spikelets not more than 1.6 mm. long, have pubescent blades.

DISTRIBUTION

Along ditches and banks and in waste ground, sometimes growing with the species, Mexico and the Lesser Antilles to Brazil.

VERA CRUZ: Orizaba, *Botteri* 110; *Bourgeau* 2752; *Hitchcock* 6318.

OAXACA: Tuxtepec, *Conzatti* 3770.

CHIAPAS: Ocuilapa, *Nelson* 3055.

GUATEMALA: Cobán, *Popenoe* 901. Secanquím, *Pittier* 206. Chamá, *Johnson* 279. Quiriguá, *Standley* 23798.

EL SALVADOR: San Salvador, *Calderón* 945. Zent Farm, *Pittier* 16734. Port Limon, *Cook & Doyle* 462.

³⁸ Bureau of Science, Manila.

PANAMA: Bocas del Toro, *Hart* 81.

VIRGIN ISLANDS: St. Thomas, *Eggers* in 1881.

WINDWARD ISLANDS: Grenada, *Broadway* 1744.

COLOMBIA: Santa Marta, *Smith* 128, 2744.

VENEZUELA: Federal District, *Pittier* 11083.

BRAZIL: Olinda, *Chase* 7655. Maceió, *Chase* 7838. Matto de São João, *Chase* 8154. Bahia, *Salzmann*. Viçosa, *Bailey* 1163, 1165; *Chase* 9426½, 9502. Lavras, *Chase* 8840; *Dorsett* 150b. Rio de Janeiro, *Chase* 8195. Santos, *Bailey* 972. Campinas, *Novaes* 1277. Franca, *Löfgren & Edwall* 2020. São Leopoldo, *Dutra* 555. Without locality, *Glaziov* 4315, 4316.

Dilatata.—Rather stout to robust perennials in leafy clumps; blades flat; racemes few to numerous; spikelets in pairs, flat; conspicuously silky-ciliate. Good forage grasses.

Racemes commonly 3 to 5; culms geniculate at base-----105. *P. dilatatum*.

Racemes commonly 12 to 18; culms erect-----106. *P. urvillei*.

105. *Paspalum dilatatum* Poir.

Paspalum dilatatum Poir. in Lam. Encycl. 5: 35. 1804. "Recueillie à Buenos-Ayres par Commerson. (V. s. in herb. Lam.)." The type, in the Paris Herbarium, has three racemes.

Paspalum platense Spreng. Syst. Veg. 1: 247. 1825. "Monte Video." The type in the Berlin Herbarium, bearing the name in Sprengel's script, was collected by Otto. The specimen has but two racemes.

Paspalum ovatum Nees; Trin. Gram. Pan. 113. 1826. "Brasil (Besser)." The type was examined by A. S. Hitchcock in the Trinius Herbarium. The plant has nine racemes, with spikelets 2.8 mm. long. It was collected by Eschscholz and communicated by Besser. Nees later³⁹ published the species as new, dividing it into *a grandiflorus* (see below) and *β parviflorus*. Under the latter he cites "Escholz in Herb. Trin.," presumably the specimen cited by Trinius under *P. ovatum* (see below), but this does not agree with the Martius specimen cited by Nees under *β* (see synonymy under *P. urvillei*).

Paspalum lanatum Spreng. Syst. Veg. 4: Cur. Post 30. 1827. Not *P. lanatum* H. B. K. 1816. "Rio Grande, Sello." The specimen in the Berlin Herbarium accompanied by a ticket with the name in Spengel's script and "Rio Grande" (no collector given), does not agree with Sprengel's description, and is, therefore, rejected as the type. It is *Paspalum ferrugineum* Trin. or an allied species. In the Trinius Herbarium is a specimen sent to Trinius by Sprengel as a new species, *P. lanatum*. It was collected at Montevideo by Otto. This has two racemes, as described by Sprengel, and otherwise agrees with his diagnosis. The long hairs of the spikelets are rather more copious than usual. It may be part of the collection upon which *P. platense* is based.

Paspalum eriophorum Schult. Mant. 2: 560. 1827. Based on *P. lanatum* Spreng., not *P. lanatum* H. B. K. Sprengel's diagnosis is copied.

Paspalus ovatus var. *grandiflorus* Nees, Agrost. Bras. 43. 1829. "Monte Video, (Sellow.) Herb. Reg. Berol." The type, in the Berlin Herbarium, bearing the name in Nees' script, has spikelets 3 mm. long.

Paspalum selloi Spreng.; Nees, Agrost. Bras. 43. 1829, as synonym of *P. ovatum* var. *grandiflorum*. "Spr. Herb. Willd."

³⁹ Agrost. Bras. 43. 1829.

Paspalum velutinum Trin.; Nees, Agrost. Bras. 43. 1829, as synonym of *P. ovatum* var. *parviflorum*. "Escholz in herb. Trin.," the only reference to Trinius, would appear to be the basis of this name. This is presumably the same as the Eschscholz specimen communicated by Besser in the Trinius Herbarium referred to under *P. ovatum* above.

Paspalum pedunculare Presl, Rel. Haenk. 1: 217. 1830. Habitat unknown. The type, collected by Haenke, was examined in the National Museum in Prague. There are 6 racemes with spikelets 2.9 to 3 mm. long. The specimen was probably collected at Montevideo or Buenos Aires, ports at which Haenke touched before crossing to Chile.

Paspalum dilatatum var. *decumbens* Vasey, Bull. Torrey Club 13: 166. 1886. No specimen nor locality is mentioned, but in a later work⁴⁰ "Louisiana (A. B. Langlois)" is cited. Langlois' no. 27 from Point-a-la-Hache, Louisiana, bearing notes and the name in Vasey's hand, is taken as the type. The spikelets are 3.2 mm. long.

Paspalum dilatatum var. *sacchariferum* Arech. Anal. Mus. Nac. Montevideo 1: 90, 1894; Gram. Uruguay 70. 1894 (reprint). "Los campos gramíneos de la República Uruguaya." There is a specimen in the United States National Herbarium from Arechavaleta bearing the name in his script. This is a rather robust plant with spikelets 3 to 3.5 mm. long.

Paspalum dilatatum forma *paucispica* Hack. in Stuck. Anal. Mus. Nac. Buenos Aires 11: 60. 1904. "Stuckert: Herb. arg. no. 11206." The type in Stuckert's herbarium at the Delessert Herbarium consists of two plants about 50 cm. tall with 3, 4, and 5 racemes.

Digitaria dilatata Coste, Fl. France 3: 553. 1906. Based on *Paspalum dilatatum* Poir.

DESCRIPTION

A rather stout perennial, in clumps of few to several culms and leafy sterile shoots from a knotted base of very short rhizomes; culms ascending to suberect from a curved or decumbent base, or some of the culms of a clump widely spreading, 40 to 175 cm. tall, simple, or sparingly branching from the lower nodes, compressed, glabrous; nodes glabrous or the lower sparsely pubescent; sheaths commonly overlapping, rather loose, compressed, the lower harshly pilose toward the base, sometimes conspicuously so, otherwise glabrous or ciliate at the summit; ligule about 3 mm. long; blades flat, ascending to spreading, 6 to 45 cm., commonly 10 to 25 cm., long, 3 to 12 mm. wide (the uppermost reduced), at base about as wide as the summit of the sheath, usually sparsely ciliate at base, otherwise glabrous, the margin scabrous; panicle erect or nodding, of 2 to 11, commonly 3 to 5, ascending to drooping rather broad racemes, the lower 4 to 11 cm., commonly 6 to 8 cm., long, the slender flattened common axis 2 to 20 cm. long; rachis narrowly winged, about 1.2 mm. wide, bearing numerous long white hairs at the base, the margin scabrous; spikelets on slender flattened pedicels, closely imbricate, 2.8 to 3.8 mm. long, about 2 mm. wide (excluding the hairs), ovate, pointed, depressed plano-convex or almost concavo-convex; glume slightly exceeding the sterile lemma, both pointed beyond the fruit, 5 to 9 nerved (lateral nerves obscure), sparsely covered with silky hairs on the surface, the glume in addition bearing on the marginal internerves a fringe of long white silky hairs, from rather scant to copious and woolly; fruit 2.4 to 2.6 mm. long, broadly elliptic, pale, minutely papillose-striate.

This species, commonly known as paspalum or paspalum grass and recently as Dallis grass, is introduced in the Southern States, where it is considered a valuable pasture grass. (See p. 4 for discussion of economic value.)

⁴⁰ Contr. U. S. Nat. Herb. 3: 19. 1892.



FIGURE 107.—*P. dilatatum*. From Hitchcock 297

"Panicles from which the spikelets have been stripped are tied into whisk brooms and used in South Carolina for brushing cotton lint from clothing, being much better for that purpose than ordinary whisk brooms."—J. B. Norton.

DISTRIBUTION

In low ground, from rather dry prairie to marshy meadows, New Jersey to Tennessee and Florida, and west to Arkansas and Texas; also adventive in Oregon, Colorado, Arizona, and California; sparingly introduced in the West Indies and in Central America; native of South America from Brazil to Argentina; also in Chile, probably introduced. Also escaped in Hawaii and Guam, the Philippines, India, Africa, and Australia, and naturalized in southern France.

NEW JERSEY: Camden, *Martindale* in 1882.

VIRGINIA: Fort Monroe, *Vasey* in 1879. Hampton, *Churchill* in 1927. Williamsburg, *Grimes* 3715, 4336.

NORTH CAROLINA: Wilmington, *Biltmore Herb.* 5690; *Hitchcock* 3868. Tryon, *Davis* 1566.

SOUTH CAROLINA: Oconee County, *Anderson* 1523. Yemassee, *Chase* 7102.

GEORGIA: Chicamauga, *Harper* 368. Stone Mountain, *Hitchcock* 3870; *Small* in 1893. Litonia, *Eggert* in 1897. Augusta, *Kearney* 210.

FLORIDA: Pensacola, *Scribner* 506. Milton, *Chase* 4324; *Swallen* 411. Marianna, *Swallen* 496, 543. Lake City, *Chase* 4285; *Combs* 202; *Hitchcock* 3869. Hillsborough County, *Fredholm* 6363. Titusville, *Nash* 2298.

TENNESSEE: Knoxville, *Ruth* 78.

ALABAMA: Marshall County, *Baker* in 1882. Springhill, *Mohr* in 1888. Mobile, *Curtiss* 6502; *Kearney* 14; *Mohr* in 1893.

MISSISSIPPI: Starkville, *Tracy* (*Dist. Seymour*) 19 and in 1892. Agricultural College, *Kearney* 35; *Pollard* 1335; *Ricker* 844. Florence, *Holt* 16. Biloxi, *Tracy* 7107.

ARKANSAS: Faulkner County, *Demaree* 2832. Little Rock, *Letterman* in 1879 and 1887. Pine Bluff, *Hitchcock* 16111.

LOUISIANA: Shreveport, *Ball* 96; *Hitchcock* 297; *Tracy* in 1897. Coushatta, *Ball* 114. Calhoun, *Ball* 68. Rayville, *Ball* 16. Melville, *Bush* 196. Baton Rouge, *Hitchcock* 3871; *Joor* in 1885; *McCulloch* in 1883. Burnside, *Combs* 1410. Lake Charles, *Allison* 147; *Tracy* 3685. Covington, *Anect* 57; *Arsène* 11410, 12235. New Orleans, *Joor* in 1885; *Waite* in 1885. Point-a-la-Hache, *Langlois* in 1883, 1885, and 1887. "Opelousas & Gulf R. R.," *Ravenel* in 1869. Without locality, *Carpenter* in 1840.

TEXAS: Fort Worth, *Ruth* 249. Ennis, *Smith* in 1897. Tatum, *Reverchon* 3455. Walker County, *Warner* in 1920. Wallisville, *Wallis* in 1880, 1881, and 1882. Galveston, *Tracy* 7370. Houston, *Fisher* 87. Waller County, *Thurrow* in 1898. Marathon, *Swallen* 1144. Without locality, *Nealley* in 1884.

OREGON: Linnton, *Nelson* 486; *Suksdorf* 1971.

COLORADO: Delta, *Lute* in 1928.

ARIZONA: Tucson, *Hitchcock* 3474.

CALIFORNIA: Butte County, *Rower* in 1905. Whittier, *Davidson* 3160.

GUATEMALA: Puerto Barrios, *Pittier* 360.

EL SALVADOR: Dept. Ahuachapán, *Padilla* 347.

COSTA RICA: Guadalupe, *Tonduz* 9395. Volcán de Turrialba, *Standley* 35180.

BERMUDA: Agricultural Station, *Brown, Britton & Bisset* 2005. Shelley Bay, *Collins* 156.

CUBA: Mariel, *Ekman* 12855, in *Amer. Gr. Nat. Herb.* 962.

JAMAICA: Richmond Park, *Harris* 12708.

DOMINICAN REPUBLIC: Haina, *Faris* 329.

BRAZIL: Marajó Island, *Goeldi* 204. Pará, *Goeldi* 131. Juiz de Fôra, *Chase* 8509, 8598. Southern Brazil, *Sello* 76.

URUGUAY: Montevideo, *Arechavaleta* 77; *Rural Federation of Montevideo* in 1924. Atahualpa, *Herter* 334. Dept. Colonia, *Herter* (*Herb. Osten*) 18784. Without locality, *Arechavaleta* in 1893 and 1894.

ARGENTINA: Posadas, *Ekman* 576. Pergamino, *Parodi* 35.

CHILE: Valparaiso, *Gunther* 7. Santiago, *Claude Joseph* 2271. Budi, *Claude Joseph* 2020. Punta, *Claude Joseph* 2164.

HAWAIIAN ISLANDS: Kauai, Lihue, *Forbes* 737. Oahu, Honolulu, *Hitchcock* 14072. Schofield Barracks, *Hitchcock* 13981. Molokai, *Hitchcock* 15153. Hawaii, Papaaloa, *Forbes* 325. Kukaiau Ranch, *Hitchcock* 14214. Hilo, *Newell* in 1917.

FRANCE: Bordeaux, *Neyrant* in 1900. Tréjus, *Bertrand* in 1902.

AFRICA: Union of South Africa, Pretoria, *Davy* 788. Natal, Newcastle, *Wood* 6189. Island of Mauritius, *Vaughan* A 5.

INDIA: Madras, *Bourne* 3027.

PHILIPPINE ISLANDS: Manila, *Hitchcock* 18099.

MARIANNE ISLANDS: Guam, *McGregor* 516.

AUSTRALIA: Port Jackson, *Pierce* (*Kneucker Gram.*) 804a.

106. *Paspalum urvillei* Steud.

Paspalus ovatus var. *parviflorus* Nees, *Agrost. Bras.* 43. 1829. "Inter Sorocaba et Villa Campanha, provinciarum S. Pauli et Minarum (Martius).—Escholz in *Herb. Trin.*" The Martius specimen, in the Munich Herbarium, bearing the name in Nees' script, is taken as the type. The Eschscholz specimen in the *Trinius* Herbarium is *P. dilatatum*. (See synonymy under that species.)

Paspalum urvillei Steud. *Syn. Pl. Glum.* 1: 24. 1854. "Ex Hrbo. Urville." A specimen in the Dumont-d'Urville Herbarium at Caen, bearing the name in Steudel's script, consists of part of a culm with a panicle 25 cm. long, of 20 racemes. The spikelets are 3 mm. long or nearly so. No locality is given for the specimen. It probably came from southern Brazil.

Paspalum dilatatum var. *parviflorum* Doell in *Mart. Fl. Bras.* 2²: 64. 1877. "Prope Pernambuco (*Forsell*) * * * Lagoa Santa (*Warming*)."⁴¹ Doell refers *P. ovatum* Nees to *P. dilatatum*, but does not cite the var. *parviflorum* Nees. The *Forsell* specimen has not been located. In Doell's herbarium in Freiburg there is a packet containing spikelets from Warming, Lagoa Santa, bearing the name in Doell's script. The spikelets are only 2 to 2.2 mm. long.

Paspalum virgatum var. *parviflorum* Doell in *Mart. Fl. Bras.* 2²: 89. 1877. "Raben in Brasilia lecta (n. 161), loco accuratius non indicato." Raben's no. 161, in the Brussels Herbarium was so named in pencil in Doell's script. The word "*virgatum*" has been erased, but is still discernible, and "*dilatatum*" written over it in Doell's script. The spikelets are 2.3 mm. long.

Paspalum virgatum var. *pubiflorum* Vasey, *Bull. Torrey Club* 13: 167. 1886. No specimen or locality is cited. In a later paper⁴¹ Vasey cites "Texas (G. C. Nealley) and Louisiana (A. B. Langlois)." The Langlois specimen in the United States National Herbarium, collected May 28, 1884, at Atakopus, Louisiana, bears notes on the sheet in Vasey's hand and three varietal names, two of them under *P. dilatatum*. The name as published was not written on the sheet by Vasey. The Nealley specimen is incomplete, hence the description must have been drawn up from the Langlois collection, which is therefore taken as the type. The spikelets are 2.5 to 2.7 mm. long.

⁴¹ *Contr. U. S. Nat. Herb.* 3: 20. 1892.

Paspalum larrañagai Arech. Anal. Mus. Nac. Montevideo 1: 60. pl. 2. 1894; Gram. Uruguay. 48. pl. 2. 1894 (reprint). "En el Salto, * * * viñedos de Harriague, y en la Vitícola Salteña." Uruguay. The type has not been examined, but the description and the plate identify the species. The spikelets are given as 2 mm. long. A specimen collected by Arechavaleta in 1892 and bearing the name in his hand is in the United States National Herbarium. The spikelets are 2.1 to 2.2 mm. long.

Paspalum vaseyanum Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 17: 32. f. 328. 1899. Based on "*P. virgatum pubiflorum* Vasey, not *P. pubiflorum* Rupr."

Paspalum griseum Hack.; Corrêa, Flora do Brazil 128. 1909. Given, without description, as the botanical name of capim milhã grande. Glaziou's no. 16559, bearing this name in Hackel's script, but crossed out by him, is taken as the type.

DESCRIPTION

A stout erect perennial in clumps of few to many culms, purplish below; culms 75 cm. to 2.5 meters tall, simple or branching from the lower, sometimes from the middle nodes, subcompressed, glabrous; nodes glabrous; sheaths keeled toward the summit, the lower loose, coarsely hirsute or glabrescent toward the summit, the upper glabrous or sometimes ciliate on the margin or with a few hairs at the summit, rarely sparsely hirsute, often somewhat auricled; ligule 3 to 5 mm. long; blades flat, ascending, relatively firm, 12 to 48 cm., commonly 20 to 30 cm., long, 3 to 15 mm. wide, rarely to 65 cm. long and 2 cm. wide (the uppermost reduced), slightly rounded at base or narrowed to the width of the sheath, densely long-pilose at the very base on the inside, otherwise glabrous, the margin scabrous; panicle erect, 10 to 42 cm. long, of 6 to 25, commonly 12 to 18, ascending to slightly drooping racemes, the lower 7 to 14 cm. long, the upper gradually shorter, narrowly ascending, the slender common axis angled, glabrous; rachis narrowly winged, about 0.8 mm. wide, with a few long hairs at the base, the margin scabrous; spikelets on slender flattened pedicels, imbricate, 2 to 3 mm., commonly 2.2 to 2.7 mm. long, 1.2 to 1.5 mm. wide (excluding the hairs), ovate, abruptly pointed, depressed plano-convex; glume and sterile lemma equal, pointed beyond the fruit, thin in texture, 3 to 5-nerved, both copiously edged with long silky white hairs, the glume sparsely clothed with appressed silky hairs throughout, the lemma glabrous or nearly so in the middle; fruit 1.8 to 2 mm. long, elliptic, pale, nearly smooth.

Some of the Brazilian specimens (Doell's type of *P. dilatatum* var. *parviflorum*, Chase 8174 and 8637) have spikelets only 2 to 2.2 mm. long.

This species, known as Vasey grass, is readily grazed while young, and in some sections of the South is cut for hay. (See p. 4 for economic value.)

DISTRIBUTION

Along ditches and roadsides, and in waste ground, mostly in rather moist soil; North Carolina to Florida and west to Texas; also in southern California, Guatemala, and Cuba; native from Brazil to Argentina; introduced in Bolivia, Chile, and the Hawaiian Islands.

NORTH CAROLINA: Wilmington, *Hitchcock* 3872.

SOUTH CAROLINA: Orangeburg, *Hitchcock* 3873.

GEORGIA: Athens, *Weatherwax* in 1921.

FLORIDA: Kissimmee, *Swallen* 230.

ALABAMA: Mobile, *Bush* 205; *Curtiss* 6508; *Kearney* 43; *Mohr* in 1893; *Tracy* 7049.



FIGURE 103.—*P. urvillei*. From Chase 4388

- MISSISSIPPI: Starkville, *Tracy* 1412 and in 1892; Agricultural College, *Kearney* 37.
- LOUISIANA: Alexandria, *Ball* 173, 451. Atakopus, *Langlois* 151. Baton Rouge, *Hitchcock* 3874. Lake Charles, *Chase* 4388, 6107. Covington, *Arsène* 11403, 12245, 12349. Port Eads, *Tracy & Lloyd* 477.
- TEXAS: Galveston, *Hitchcock* 3875. Hockley, *Thurrow* in 1906. Seabrook, *Fisher* 5067. Sheldon, *Reverchon* 4180. Houston, *Nealley* in 1892; *Thurrow* 11 in 1912. Beaumont, *Reverchon* 4180 A. San Antonio, *Hitchcock* 5192, 5327. Without locality, *Nealley* in 1884, 1886, and 1892.
- CALIFORNIA: Palm Springs, *Parish* 8620.
- GUATEMALA: Puerto Barrios, *Hitchcock* 9148; *Pittier* 363.
- CUBA: Baraguá, *Hitchcock* 23353.
- BRAZIL: Marajó Island, *Goeldi* 259. Anna Florencia, *Chase* 9473. Viçosa, *Chase* 9433. Serra do Cipó, *Chase* 9265. Itacolumy, *Chase* 9425. Juiz de Fóra, *Chase* 8637. Est. Minas Geraes, *Glaziov* 20561a. Alto da Serra, *Chase* 9767. Rio de Janeiro, *Chase* 8174, 8235. Sorocaba, *Mosén* 3511. Itapetininga, *Löfgren* 469. Campinas, *Novaes* 1278. Rio Pardo, *Jürgens* G 41. São Leopoldo, *Dutra* (*Mus. Nac. Rio Jan.*) 16478. Central Brazil, *Glaziov* 470. Without locality, *Glaziov* 477; *Sello* 3567.
- URUGUAY: Montevideo, *Rural Federation of Montevideo* in 1924. Without locality, *Arechalaveta* in 1893 and 1898.
- PARAGUAY: Rio Apa, *Hassler* 11916. Sierra de Amambay, *Hassler* 9902. Central Paraguay, *Morong* 549.
- BOLIVIA: Sorata, *Gunther* in 1926.
- ARGENTINA: Tapias, *Venturi* 2329. Posadas, *Ekman* 577. Córdoba, *Stuckert* 5416, 12917, (*Kneucker Gram.*) 365. Dept. San Alberto, *Stuckert* 10793. Terr. de Formosa, *Jørgensen* 3300. Prov. Catamarca, *Venturi* 3771, 7165. Prov. Tucumán, *Venturi* 1782. Without locality, *Jørgensen* 1145.
- CHILE: Curico, *Claude Joseph* 5734.
- HAWAIIAN ISLANDS: Oahu, Manoa Valley, *Hitchcock* 13737, 14081.
- AFRICA: Transvaal, *Barborton*, *Thorncroft* in 1904.

Fasciculata.—A robust creeping perennial with flat blades and large flabellate panicles. One allied species in South America.

107. *Paspalum fasciculatum* Willd.

Paspalum fasciculatum Willd.; Flüggé, Monogr. Pasp. 69. 1810. The species is divided into α "Brasilia. Hoffmannsegge;" β "Peruvia. Humboldt et Bonpland," and γ "America meridionalis. Humboldt et Bonpland." The Hoffmannsegge specimen, in the Wildenow Herbarium in Berlin, taken as the type, consists of pieces of a large plant with a panicle 15 cm. long, the spikelets ciliate along the edges. The Humboldt and Bonpland specimen in the Berlin Herbarium is marked "Habitat in Peruv. Humb. 3813. gamalote," and also " β in loc. siccioribus, γ in humidis." There are two pieces on the sheet, but nothing to indicate which is which. In the general Paris Herbarium is a specimen marked 'Bonpl. 3813, Guayaquil. *Paspalum fasciculatum*' in Bonpland's script. Another of the same collection is marked var. β . In the segregated Humboldt, Bonpland, and Kunth Herbarium is a specimen labeled "Guayaquil San Borodon & Estero del Lagarto." These specimens are rather small plants with smaller panicles. Kunth⁴² cites only the latter collection.

Paspalum vaginatum var. *pleostachyum* Doell in Mart. Fl. Bras. 2²: 75. 1877. "Prope Manáos prov. do Alto Amazonas * * * (Spruce n. 1460*)." A specimen of this collection bearing the name in Doell's script is in the Drake

⁴² H. B. K. Nov. Gen. & Sp. 1: 89. 1816.

Herbarium in Paris. It is a depauperate specimen of *P. fasciculatum* only 70 cm. long, and with but 7 racemes. In the Kew Herbarium this collection bears a note by Spruce: "Barra, shore of river, frequent, but so much nipped by goats that I have never seen but these two specimens in flower."

Paspalum fasciculatum var. *glabratum* Doell in Mart. Fl. Bras. 2²: 91. 1877. Based on *P. fasciculatum* γ H. B. K., which is described as having glabrous spikelets.

DESCRIPTION

A large extensively creeping leafy stoloniferous perennial, the glabrous compressed culms sometimes as much as 1 cm. thick and several meters long, the bases rooting at the nodes and forming a tangled mass, the stolons, especially in open ground, as much as 5 meters long, with reduced usually pilose leaves, the erect sparingly branching flowering culms 0.7 to 2 meters tall, the leaves on the sterile shoots aggregate at the summit in a flabellate mass; nodes from glabrous to densely bearded; sheaths broad, relatively short, densely ciliate on the margin, sparsely papillose-pilose toward the summit at least on the keel, rarely glabrous;

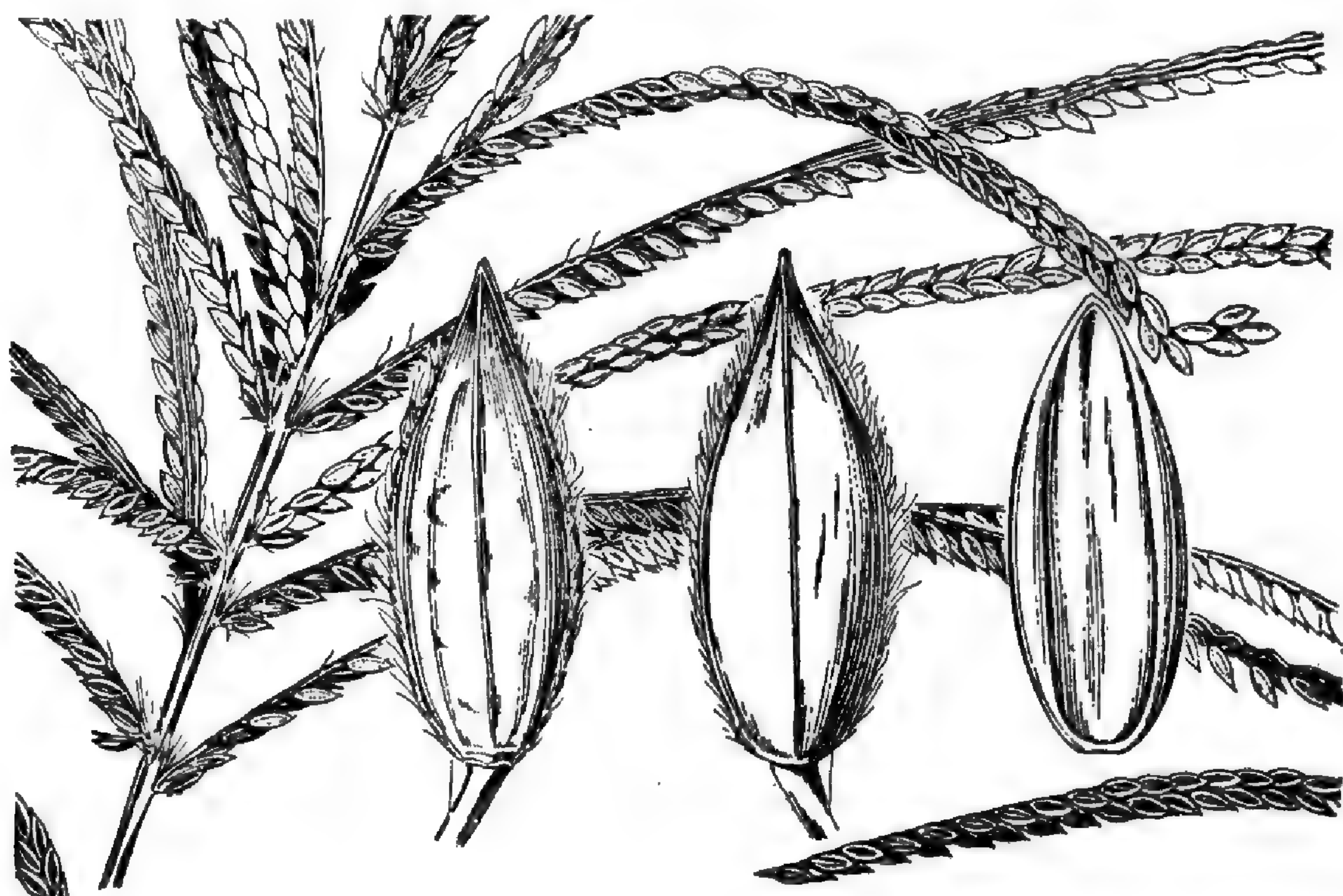


FIGURE 109.—*P. fasciculatum*. From Hitchcock 7899

ligule firm, about 0.7 mm. long, with a dense ring of long hairs back of it; blades flat, ascending to spreading, 20 to 60 cm. long, 1.2 to 3 cm. wide (the uppermost and those of the ultimate branches reduced), slightly rounded at base, very scabrous on the margins, both surfaces from glabrous to sparsely papillose-pilose, the pubescence on the lower surface mostly along the prominent midnerve; panicle short-exserted, mostly flabellate in outline, of 7 to 30, commonly 12 to 20, racemes, ascending to drooping, 7 to 17 cm. long, aggregate on a rather short stout angled axis, bearing long white hairs in the axils; rachis 1 to 1.5 mm. wide, the margin scabrous and occasionally bearing a few scattered long hairs; spikelets solitary on flat pedicels, mostly imbricate, 4 to 4.5 mm., rarely to 5 mm., long, 1.5 to 1.8 mm. wide, elliptic, abruptly acuminate, depressed plano-convex; first glume often developed as a minute nerveless hyaline scale, large and 1 to 3-nerved in occasional spikelets; second glume and sterile lemma equal, pointed beyond the fruit, lightly 3 to 7-nerved, the glume from copiously to sparsely silky-ciliate on the margin, occasionally glabrous or nearly so, the lemma glabrous

or sparsely ciliate toward the summit, often slightly wrinkled within the paler border; fruit 3.7 to 3.8 mm. long, at maturity light brown, smooth and shining.

This species is a common weed in banana plantations in Costa Rica. It is eaten by cattle, but the situations in which it grows are usually inaccessible to them.

DISTRIBUTION

Borders of streams, low ground, and swamps, at low altitudes, southern Mexico to Ecuador and Argentina. In common with other large grasses this is called "gamalote" in Spanish America; in El Salvador it is called "camalote negro."

VERA CRUZ: Córdoba, *Hitchcock* 6428.

TABASCO: San Juan Bautista, *Rovirosa* 260.

GUATEMALA: Cubilquitz, *Türkheim* II. 181. Cobán, *Popenoe* 909. Puerto Barrios, *Hitchcock* 9150.

EL SALVADOR: Ateos, *Calderón* 1881. San Salvador, *Calderón* 1150, 1151; *Renson* in 1922. Sonsonate, *Hitchcock* 8966.

COSTA RICA: San José, *Hitchcock* 8464; *Tonduz* 7225. Puntarenas, *Hitchcock* 8576. San Francisco de Guadalupe, *Pittier* 7147, 16118. Port Limon, *Hitchcock* 8424. Without locality, *Tonduz* 220.

PANAMA: Canal Zone, *Hitchcock* 7899, 8114; *Killip* 12125; *Piper* 5215; *Pittier* 4020, 4435, 6841. Changuinola Valley, *Dunlap* 199.

TRINIDAD: St. Joseph, *Hitchcock* 10029.

TOBAGO: Plymouth, *Hitchcock* 10281.

COLOMBIA: Island of Mompas, *Curran* 366. Magangue, *Pennell* 3933.

VENEZUELA: Lower Orinoco, *Rusby & Squires* 356.

DUTCH GUIANA: Paramaribo, *Kuyper* in 1913.

BRAZIL: Pará, *Goeldi* 114, 115. Tabatinga, *Kuhlmann* 1280.

PARAGUAY: Central Paraguay, *Morong* 535. Trinidad, *Rojas* 1688. Río Paraguay, *Lorentz* 70.

ECUADOR: Balao, *Eggers* 14104.

ARGENTINA: Terr. de Formosa, *Jørgensen* 2426. Puerto Formosa, *Parodi* 8345.

Laevia.—Perennials, with very short rhizomes; culms rather tall, compressed, simple or occasionally with reduced flowering branches from the lower or middle sheaths; racemes few to several; spikelets solitary (in *P. praecox*, *P. lentiferum*, and *P. erectum* solitary or paired), from broadly oval to orbicular, depressed plano-convex, glabrous.

Spikelets solitary; glume and sterile lemma firm.

Spikelets orbicular, 3 to 3.2 mm. long, scarcely one-third as thick; blades usually equaling the base of the panicle or overtopping it.

110. *P. circulare*.

Spikelets longer than broad, more than one-third as thick; panicle usually much exceeding the blades.

Sheaths and blades pilose, mostly conspicuously so. 109. *P. longipilum*.

Sheaths and blades from glabrous or nearly so to sparsely pilose.

108. *P. laeve*.

Spikelets solitary and paired in the same raceme (rarely all solitary or all paired).

Lower sheaths strongly compressed-keeled; spikelets suborbicular; glume and sterile lemma thin, the cells visible.

Spikelets 2.2 to 2.5 mm. (rarely to 2.8 mm.) long; foliage not conspicuously villous. 111. *P. praecox*.

Spikelets 2.7 to 3.4 mm. long; lower sheaths and blades mostly conspicuously villous at least at base-----112. *P. lentiferum*.
Lower sheaths not compressed; spikelets broadly obovate; glume and sterile lemma rather firm, minutely papillose-roughened-----113. *P. erectum*.

108. *Paspalum laeve* Michx.

Paspalum laeve Michx. Fl. Bor. Amer. 1: 44. 1803. "Hab. in Georgia." The type specimen, in the Paris Herbarium, is a single culm with 4 leaves and 3 racemes. The spikelets are 2.5 mm. long and brownish tinged. The plant is glabrous and just about the average for this variable species, not the form with short blades crowded at base nor the one with elongate blades. In the Drake Herbarium is a second specimen labeled "*Paspalum laeve* Michaux, Georgia" in Richard's script. This consists of two plants, each with 4 racemes.

Paspalum undulosum LeConte, Journ. de Phys. 91: 284. 1820. "Habitat in Georgia." The specimen bearing this name in LeConte's handwriting in the herbarium of the Academy of Natural Sciences, Philadelphia,⁴³ is part of a culm of a tall plant of *P. laeve*. This agrees with the description except in "spicis 4-6," this having 8 racemes, the upper two much reduced. LeConte evidently had other material.

Paspalum angustifolium LeConte, Journ. de Phys. 91: 285. 1820. "Habitat in Carolina et Georgia." The specimen bearing this name in LeConte's handwriting in the herbarium of the Academy of Natural Sciences, Philadelphia,⁴³ is part of a culm of a slender narrow-leaved plant, bearing 3 racemes. This specimen agrees with the description and is accepted as the type, though LeConte evidently drew up his description from additional material, since he says "spicis 2-3."

Paspalum lecomteanum Schult. Mant. 2: 168. 1824. Based on *P. undulosum* LeConte, the name changed because of *P. undulatum* Poir.

Paspalum punctulatum Bertol. Mem. Accad. Sci. Bologna 2: 599. pl. 42. f. a-e. 1850. The type, from Alabama, has not been seen. The description and plate indicate a specimen like the type of *P. angustifolium*.

Paspalum alternans Steud. Syn. Pl. Glum. 1: 26. 1854. "Hartman hrbr. nr. 40. Louisiana." The type has not been located. The sheaths and blades are described as being sparsely pilose toward the margin and base, the blades 2 to 4 inches long.

Paspalum tenue Darby, Bot. South. States 576. 1857. Not *P. tenue* Gaertn. 1791. "Geo. and northward." The type has not been located. The description applies to the long-leaved form of *P. laeve*.

Paspalum laeve var. *undulosum* Wood, Class-book 782. 1861. Based on *P. undulosum* LeConte.

Paspalum laeve var. *angustifolium* Vasey, Bull. Torrey Club 13: 165. 1886. Based on *P. angustifolium* LeConte.

Paspalum laeve var. *brevifolium* Vasey, Contr. U. S. Nat. Herb. 3: 18. 1892. "*P. undulosum* LeConte" is cited as a synonym, but a brief description is given. This is presumably intended as a new variety rather than a change of name. The specimen in the United States National Herbarium, bearing the name in Vasey's script, was collected in Texas by Nealley in 1886. The culm blades are as much as 15 cm. long.

Paspalum australe Nash in Britton, Man. 1039. 1901. "Type collected by Dr. J. K. Small, at Stone Mt., Ga., Aug. 1-6, 1895," in the herbarium of the New York Botanical Garden, is the form with relatively short blades, pilose

⁴³ See footnote 57, p. 32.

above and sometimes toward the base beneath, and sheaths pilose on the margin.

Paspalum laeve australe Nash in Hitchc. Rhodora 8: 205. 1906. Based on *P. australe* Nash.

DESCRIPTION

A tufted perennial commonly with numerous erect or ascending leafy shoots at the base; culms erect or ascending, 0.4 to 1 meter tall, rarely taller, simple or rarely with concealed or short-exserted raceme-bearing branches in the lower sheaths, compressed, glabrous; sheaths compressed-keeled, several usually crowded at the base, glabrous or pilose on the margins or sometimes on the back toward the summit; ligule brown, 2 to 3 mm. long; blades usually folded at base, flat or folded above, rather firm, commonly erect or nearly so, sometimes glaucous, 5 to 30 cm. long, rarely longer, 3 to 10 mm., rarely 12 mm., wide, the uppermost often reduced, glabrous to ciliate or sparsely pilose on the upper surface, or sometimes toward the base beneath; racemes 2 to 5, commonly 3 or 4, rarely 6 to 8, spreading or ascending, 3 to 10 cm. long, rarely longer, the common axis slender, glabrous; rachis about 1 mm. wide, with a tuft of long hairs at the base; spikelets not crowded, 2.5 to 3 mm. long, 2 to 2.5 mm. wide, broadly oval to suborbicular; glume and sterile lemma equal, toward maturity the tip of the fruit usually exposed, 5-nerved, the middle of the lemma commonly russet-brownish; fruit nearly the size and form of the spikelet.

Forms of this exceedingly variable species have been regarded as distinct species or varieties. A prolonged study of a large amount of material has failed to correlate any two of the different characters. Michaux's type is about half-way between *P. angustifolium* and the short-leaved form, *P. laeve brevifolium* Vasey, though the type of the latter is not itself one of the conspicuously short-leaved specimens with short, nearly naked culms. The forms have been differentiated as follows: Plants with elongate blades and racemes, the blades glabrous or pilose near the margin, as *P. angustifolium*; those with blades (usually short) sparsely pilose above and sheaths pilose on the margin, as *P. australe*; and those with short, glabrous leaves, mostly crowded toward the base, as *P. laeve* proper. If we try to segregate the specimens into these groups, however, the intermediate specimens are more numerous than those referable to definite forms, and the material so segregated appears scarcely more homogeneous than does the intermediate material. Pubescence, particularly, varies greatly in a single plant. The commoner form, especially in the Gulf States, is *P. angustifolium*, mostly with blades sparsely pilose toward the base. The more pubescent form, *P. australe*, is found mostly near the coast in pineland.

In Mississippi is a form like *P. laeve brevifolium* but with spikelets only 2 to 2.2 mm. long. This is found only in low pine woods along the Gulf Coast. The following are of this form: Horn Island, *Tracy* 2860. Biloxi, *Chase* 4330, 4350, 4354; *Tracy* 4624; *Tracy & Ball* 23.

Where it grows plentifully this species affords a nutritious hay. Together with the allied species it is called field paspalum.

DISTRIBUTION

Fields, meadows, open woods, and waste ground, especially common in red clay soil, New Jersey and Pennsylvania to Florida and eastern Texas.

NEW JERSEY: Camden, *Scribner* 14. Cold Spring, *Pennell* 2203.

PENNSYLVANIA: Nottingham, *Pennell* 2273. Philadelphia, *Scribner* in 1878.

MARYLAND: Hyattsville, *Scribner* in 1888. Lanham, *Maxon* 5893; *Maxon & Standley* 14. Bethlehem, *Killip* 7265.

DISTRICT OF COLUMBIA: Chain Bridge, *Chase* 3634. Chevy Chase, *Chase* 2600, 9937. Washington, *Chase* 2593; *Scribner* in 1894; *Steele* in 1896; *Vasey* in 1882. Takoma Park, *Amer. Gr. Nat. Herb.* 966.



FIGURE 110.—*P. laeve*. From *Chase* 2600

VIRGINIA: Fourmile Run, *Steele* in 1896. Lanexa, *Grimes* 4148. Portsmouth, *Noyes* 109. Dismal Swamp, *Chase* 3648. Ocean View, *Kearney* 1473. Norfolk County, *Kearney* 1785. Cape Henry, *Hitchcock* 3876; *Norton* 313. Virginia Beach, *Britton* in 1895; *Hitchcock* 3877; *Williams* 3091.

WEST VIRGINIA: Baileysville, *Morris* 1284.

NORTH CAROLINA: Biltmore, *Biltmore Herb.* 814a. Black Mountain, *Standley & Bollman* 10431. Columbus, *Townsend* in 1897. Heiligs Mill, *Small & Heller* in 1891. Magnetic City, *Weatherby* 15. Wilmington, *Hitchcock* 3878; *Kearney* 254.

SOUTH CAROLINA: Clemson College, *House* 2342. Hartsville, *Coker* in 1908. Ebenezer, *Bartlett* 2826. Batesburg, *McGregor* 180. Aiken, *Kearney* 240; *Ravenel* in 1882. Anderson, *Davis* 1591. Orangeburg, *Hitchcock* 3879. Isle of Palms, *Norton* 367a. Without locality, *Delile* in 1806.

GEORGIA: Fannin County, *Smith* 2586. Americus, *Tracy* 3667. Savannah, *Kearney* 182. Blakely, *Harper* 1904. Thomasville, *Tracy* 3672.

FLORIDA: Milton, *Chase* 4317; *Swallen* 369, 388. Chipley, *Combs* 630. Marianna, *Swallen* 532; *Tracy* 3678. Chattahoochee, *Curtiss* 5937; *Tracy* 3681. Quincy, *Combs* 409. Tallahassee, *Combs* 367, 385; *Kearney* 78. Monticello, *Combs* 310½, 344. Jefferson County, *Hitchcock* 2506. Madison, *Combs* 292. Suwanee County, *Hitchcock* 2499. Lake City, *Combs* 158½. Jacksonville, *Curtiss* 5092 in part, 5098; *Kearney* 154a. Pablo Beach, *Chase* 7059. Gainesville, *Chase* 4255; *Combs* 718, 726. Ellzey, *Combs* 810. Lake Butler, *Baker* 302. Kissimmee, *Swallen* 234. Hillsborough County, *Fredholm* 6399. Fort Myers, *Hitchcock* 501.

KENTUCKY: Pineville, *Garman* in 1911.

TENNESSEE: Hollow Rock, *Eggert* in 1897; *Gattinger* in 1886. Robertson County, *Gattinger* in 1886. Knoxville, *Scribner* in 1893. Roan Mountain, *Hitchcock* 3881.

ALABAMA: Lookout Mountain, *Ruth* 80. Scottsboro, *Chase* 4505. Valley Head, *Ruth* 22. Dixie, *Tracy* 8040. Selma, *Kearney* 5, 11. Chehaw, *Hitchcock* 3880. Auburn, *Pollard & Maxon* 69, 75. Tuskegee, *Carver* 50, 75. Union Springs, *McCarthy* 309. Mobile, *Mohr* in 1884. Without locality, *Buckley*.

MISSISSIPPI: Panola County, *Eggert* in 1896. Lake, *Tracy* 1561, 1571. Nicholson, *Kearney* 347, 351, 354. Biloxi, *Kearney* 308; *Tracy* 1886, 1887, 1892, 1896, 3775, 3866, 4625, 4626; *Tracy & Ball* 20.

LOUISIANA: Calhoun, *Ball* 48½. Lake Charles, *Tracy* 3685. Covington, *Arsène* 11009, 11401½.

TEXAS: Texarkana, *Plank* 94; *Tharp* 2014. Beckville, *Reverchon* 3464. Industry, *Wurzlöw* in 1892. Hempstead, *Hall* 809.

109. *Paspalum longipilum* Nash

Paspalum laeve var. *pilosum* Scribn. Tenn. Agr. Exp. Sta. Bull. 7: 34. 1894. No particular locality in Tennessee is given for the variety. In the Scribner Herbarium, now in the United States National Herbarium, is a specimen collected at Madisonville, Tennessee, by F. L. Scribner, and marked in his hand "*Paspalum laeve* Mx. var.," which is probably the type.

Paspalum longipilum Nash, Bull. N. Y. Bot. Gard. 1: 435. 1900. "Type collected by the writer [G. V. Nash] at Eustis, Lake Co. [Fla.] * * * no. 1027." This specimen is in the herbarium of the New York Botanical Garden and duplicates of it are in the National Herbarium. The sheaths, especially the lower, are conspicuously pilose with long spreading hairs; the blades are long-pilose on the upper surface and, except for a few hairs on the midvein, glabrous beneath.

Paspalum plenipilum Nash in Britton, Man. 73. 1901. "In dry places, N. J." The type, in the herbarium of the New York Botanical Garden, was collected in the vicinity of Clifton, Passaic County, N. J., by George V. Nash, August 31, 1892. In this specimen the sheaths are pilose, but less conspicuously so than in

the type of *P. longipilum*; the blades are pilose on both surfaces, more sparsely so beneath.

DESCRIPTION

Similar to *P. laeve*, the culms usually ascending or spreading, the leafy shoots at base mostly fewer, a raceme-bearing branch often borne (usually hidden) in next to the lowest sheath; sheaths pilose with long hairs, often conspicuously so, but sometimes very sparsely; blades usually flat, pilose on both surfaces or glabrous or nearly so beneath, commonly less erect than in *P. laeve*; racemes 2 to 6, commonly 2 or 3, on the average more lax and spreading than in *P. laeve*; spikelets 2.5 to 2.8, rarely to 3 mm. long, 2 to 2.4 mm. wide, the fruit usually covered at maturity, the sterile lemma often tinged with russet.

This species is fairly distinct from *P. laeve*, but a few specimens grade into the form represented by the type of *P. australe*. A few others, with spikelets 2.8 to 3 mm. long, are scarcely distinguishable from *P. circulare*, but the spikelets are less rounded and the glume and sterile lemma rather thicker.

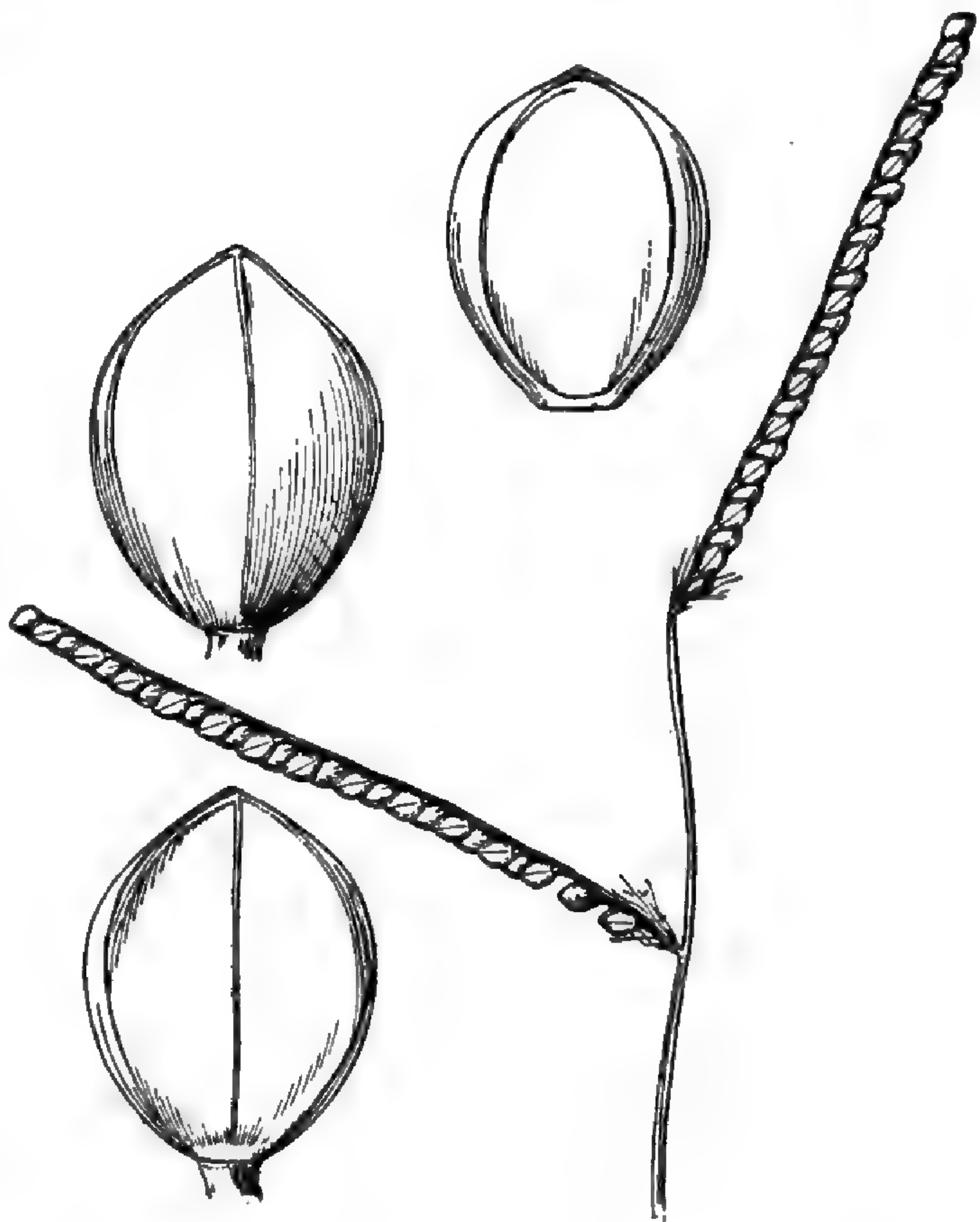


FIGURE 111.—*P. longipilum*. From type collection

This species is common in the savannas and flatwoods of Florida where it is an important constituent of native pastures.

DISTRIBUTION

Damp mostly sandy soil, savannas, open woods, and wet pine barrens, New York to Tennessee and Florida and west to Texas.

NEW YORK: Bronx Park, *Nash* in 1896.

NEW JERSEY: Cold Spring, *Pennell* 2144; *Stone* 8232.

PENNSYLVANIA: Allentown, *Pretz* 1403. Without locality, *Brinton*.

DELAWARE: Townsend, *Canby* in 1865.

MARYLAND: Prince George County, *Smith* 2754. California, *Hitchcock* 7863.

Chesapeake Beach, *Chase* 6137. Ocean City, *Commons* 312.

DISTRICT OF COLUMBIA: Washington, *Mohr* in 1882; *Ward* in 1878.

VIRGINIA: Hunting Creek, *McAtee* 2782. Portsmouth, *Chase* 3684; *Noyes* 109½, 110. Norfolk, *Kearney* 296.

NORTH CAROLINA: French Broad River, *J. D. Smith* in 1880. Asheville, *Hitchcock* 3882. Biltmore, *Hitchcock* 3883. Wilmington, *Hitchcock* 3884, 3885.

SOUTH CAROLINA: Ebenezer, *Bartlett* 2836. Floyds, *Norton* 358b. Sumter, *J. D. Smith* in 1884.

GEORGIA: Rome, *McCarthy* in 1888. Cedartown, *Ball* in 1904. Athens, *Harper* 114. Stone Mountain, *Hitchcock* 3886. Thomson, *Bartlett* 1503. Savannah, *Kearney* 184. Camilla, *Tracy* 3670.

FLORIDA: Pensacola, *Combs* 528. Apalachicola, *Biltmore Herb.* 8338. Milton, *Swallen* 416. Marianna, *Swallen* 538. Tallahassee, *Nash* 2344. Monticello, *Combs* 309. Chattahooche, *Tracy* 3677. Lake City, *Combs* 77, 197; *Hitchcock* 2504. Jacksonville, *Combs* 2; *Curtiss* 4990 in part. Gainesville, *Chase* 4230; *Combs* 759. Waldo, *Combs* 693. Homosassa, *Combs* 948. Crystal, *Combs* 1002. Eustis, *Chase* 4057, 4083; *Hitchcock* 2507; *Nash* 507, 600, 1027, 1340, 2080. Orlando, *Baker* 303. Orange City, *Hood* 28. Sanford, *Chase* 4040. Titusville, *Chase* 3983. Merritt Island, *Swallen* 178. Tampa, *Combs* 1351. Bartow, *Combs* 1217½. Fort Myers, *Chase* 4145.

TENNESSEE: Madisonville, *Scribner* in 1891. Knoxville, *Scribner* in 1889. Wolf Creek, *Kearney* 944. Without locality, *Gattinger* in 1878.

ALABAMA: Birmingham, *Hitchcock* 3887. Auburn, *Tracy* 3740, 3792. Tuskegee, *Carver* 24, 51, 74. Spring Hill, *Bush* 207. Mobile, *Hitchcock* 3888; *Mohr* in 1885.

MISSISSIPPI: Waynesboro, *Kearney* 170. Biloxi, *Tracy* 3739.

LOUISIANA: Natchitoches, *Ball* 165. Baton Rouge, *Hitchcock* 3889. Covington, *Arsène* 11015½.

TEXAS: Waller, *Hitchcock* 1188.

110. *Paspalum circulare* Nash

Paspalum circulare Nash in *Britton Man.* 73. 1901. "In moist or dry fields, N. Y. to N. C.; also in Mo." In the herbarium of the New York Botanical Garden is a specimen marked in Nash's handwriting "Type of *Paspalum circulare* Nash." This was collected in Bergen County, New Jersey, August 18, 1889, by George V. Nash.

Paspalum praelongum Nash in *Small, Fl. Southeast. U. S.* 74, 1326. 1903. "Type, Washington, D. C., Nash, Sept. 5, 1894, in *Herb. Nash.*" This specimen, now in the herbarium of the New York Botanical Garden, is a stouter plant than the type of *P. circulare*, the sheaths rather sparsely pilose, the blades pilose on both surfaces, some of them as much as 30 cm. long.

Paspalum laeve circulare Stone, *Ann. Rep. N. J. Mus.* 1910: 187. 1911. Based on *P. circulare* Nash.

DESCRIPTION

An ascending perennial with leafy shoots at the base, in dense tufts; culms few to several, commonly 30 to 80 cm., sometimes to 1.3 meters, tall, compressed, glabrous, often with branches bearing one

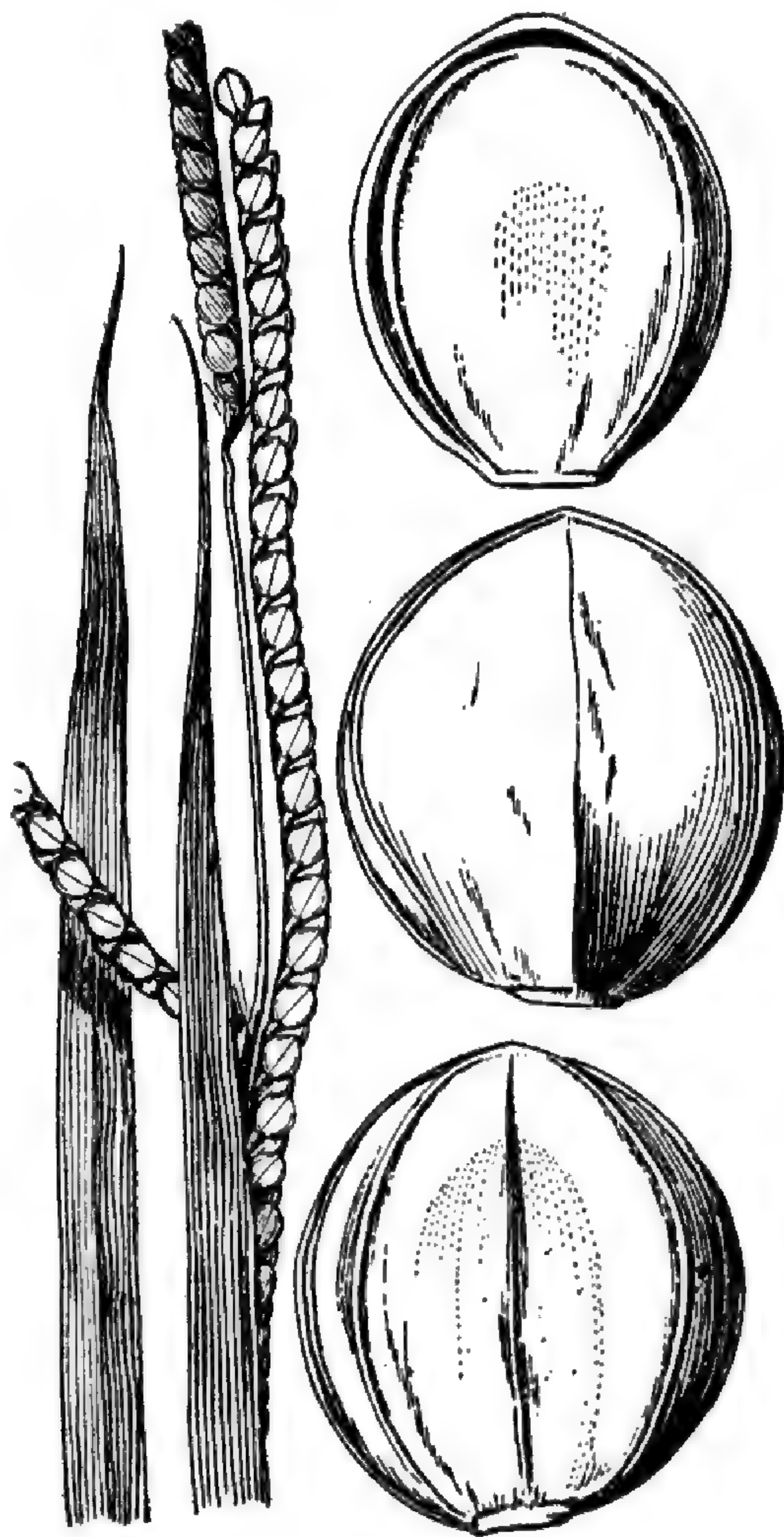


FIGURE 112.—*P. circulare*. From type and *Chase* 3836

leaf and a single raceme more or less concealed in the middle sheaths, rarely with a longer branch from a lower node; sheaths compressed, rather thin and loose, mostly elongate, the lower sparsely to densely pilose or glabrous, the upper glabrous or nearly so; ligule brown, 2 to 3 mm. long; blades flat, erect or sub-erect, rather thin, scarcely narrowed at the base, commonly 15 to 30 cm. long,

or those of the midculm sometimes longer, 5 to 10 mm. wide, commonly equaling or exceeding the inflorescence, sometimes reaching only to its base, or the inflorescence short-exserted, usually pilose on the upper surface, at least toward the base, and glabrous beneath, sometimes pilose on both surfaces; racemes 2 to 7, mostly suberect or the lower spreading, 5 to 12 cm. long, the common axis slender, glabrous; rachis scarcely 1 mm. wide, with a few long hairs at the base; spikelets approximate, 2.8 to 3.2 mm. long, nearly orbicular; glume and sterile lemma equal, covering the fruit, 5-nerved, rather thin, the cells showing more plainly than in *P. laeve* and *P. longipilum*; fruit nearly the size and form of the spikelet.

The greater amount of material of this species is reasonably distinct, differentiated from *P. laeve* by stouter culms with longer blades and thicker racemes of larger rounder spikelets. But nearly glabrous plants of drier ground are often more slender, with shorter blades, and are scarcely distinguishable from *P. laeve*. The larger plants with rather densely pilose lower sheaths are the form described as *Paspalum praelongum*, but pubescence is not coupled with larger size. In the material distributed under *Amer. Gr. Nat. Herb.* 969 for example, the culms are 1 to 1.3 meters tall, but are glabrous or nearly so.

Paspalum circulare is the leafiest of the *Laevia* group and is a palatable forage grass. In southern Indiana it forms an important constituent of the native pasture.

DISTRIBUTION

Fields and meadows and open waste ground, Connecticut to North Carolina and Mississippi and west to Kansas and Texas.

CONNECTICUT: Orange, *Woodward* in 1910; *Woodward & Bissell* 5846. Franklin, *Woodward* in 1910. Groton, *Bissell* in 1905.

NEW YORK: New York, *Bicknell* in 1896. Yonkers, *Nash* in 1898.

NEW JERSEY: Woodbridge, *Lighthipe* in 1891. Cold Spring, *Stone* in 1910. Monmouth County, *Knieskern*. Lawnside, *Stone* 10743.

PENNSYLVANIA: Lehigh County, *Krout*. Conewago, *Heller* 701. Reinholdsville, *Porter* in 1866. Chambersburg, *Porter* in 1897.

INDIANA: Atherton, *Deam* 24010. Linton, *Deam* 24042. Madison, *Deam* 18846. Huntingburg, *Deam* 28316. State Reservation, Clarke County, *Deam* 7538. Laconia, *Deam* 30189. Hovey Lake, *Deam* 10155. Mt. Vernon, *Deam* 29090. Chrisney, *Deam* 28973. Vincennes, *Deam* 45566.

ILLINOIS: Marshall, *Bock & Chase* 18½. Robinson, *Bock & Chase* 28. Flat Rock, *Bock & Chase* 36. Maude, *Bock & Chase* 50. Browns, *Bock & Chase* 53. Wabash County, *Schneck* in 1880. Albion, *Bock & Chase* 57. Brownsville, *Bock & Chase* 62, 72, 74. Harrisburg, *Bock & Chase* 67, 69, 70. Richland County, *Ridgway* 3250, 3314. Eichorn, *Bock & Chase* 77, 78. Homberg, *Bock & Chase* 101. Metropolis, *Bock & Chase* 103, 106. Grand Chain, *Bock & Chase* 142. Unity, *Bock & Chase* 162. Mill Creek, *Bock & Chase* 165, 168, 174. Carbondale, *Bock & Chase* 178. Ruma, *Bock & Chase* 188. Red Bud, *Bock & Chase* 194.

MISSOURI: Sheffield, *Bush* 5086, 5087. Allenton, *Letterman* in 1897. Webb City, *Bush* 5183; *Palmer* 3067, 31488. Springfield, *Hoover* in 1897; *Standley* 1802, 8581, 9080, 9579, 9726, 9769. Cedar Gap, *Metcalf* 915. Greene County, *Bush* 107. Carthage, *Palmer* 3140. Monteer, *Bush* 8723, 8723 A. Purdy, *Bush* 3248. Howell County, *Bush* 59. Poplar Bluff, *Letterman*. McDonald County, *Bush* 63. Delta, *Palmer* 31640. Paw Paw, *Bush* 213.

KANSAS: Cherokee County, *Hitchcock* 872.

DELAWARE: Wilmington, *Commons* 86.

- MARYLAND: Riverdale, *Chase* 3836. Berwyn, *Chase* 9945, 9946, 9965, 9967. Chevy Chase, *Chase* 9969.
- DISTRICT OF COLUMBIA: Washington, *Vasey* in 1882; *Ward* in 1877.
- VIRGINIA: Arlington, *Ball & Paddock* 47; *Chase* 3021½. Hampton, *Churchill* in 1927.
- WEST VIRGINIA: Summersville, *Univ. Exp. Sta.*
- NORTH CAROLINA: Chapel Hill, *Coker* 35. Graphiteville, *Standley & Bollman* 10098. Tar River, *McCarthy* in 1884. Heiligs Mill, *Small & Heller* 198. Greenville, *Chase* 4571.
- KENTUCKY: Poor Fork, *Kearney* 195. Without locality, *Kearney* 253.
- TENNESSEE: Nashville, *Gattinger*. Knoxville, *Scribner* in 1889. Tullahoma, *Gattinger* 3570. Sumner County, *Gattinger* in 1883.
- MISSISSIPPI: Starkville, *Chase* 4442, 4447, 4450; *Kearney* 62; *Tracy* 1530. Centerville, *Tracy* 3687. Holly Springs, *Tracy* 1533. Without locality, *Tracy* 25.
- ARKANSAS: Fayetteville, *Hitchcock* 16096. Benton, *Greenman* 4297. Clay County, *Eggert* in 1896; Pine Bluff, *Eggert* in 1896; *Hitchcock* 16126. Fulton, *Bush* 887. Texarkana, *Heller* 4234. Winslow, *Ruth* 62. Hagler, *Chamberlain* 123. Central Arkansas, *Harvey* in 1884.
- LOUISIANA: Calhoun, *Ball* 48. Oberlin, *Ball* 189. Coushatta, *Ball* 117. Alexandria, *Ball* 172, 642. Abbeville, *Langlois* 19. Rayville, *Ball* 10. Baton Rouge, *Hitchcock* 3890.
- TEXAS: Texarkana, *Heller* 4193; *Tharp* 2016. Houston, *Hall* 810. Industry, *Wurzlów* in 1892. Waller County, *Thurrow* in 1898. Brazos County, *Nealley* 91 in 1882. Tyler, *Reverchon* 2214. Corpus Christi, *Hitchcock* 3891. Without locality, *Nealley* in 1884, 1886, and 1889; *Plank* 46.
- OKLAHOMA: Sapulpa, *Bush* 691. Without locality, *Sheldon* in 1891.

111. *Paspalum praecox* Walt.

Paspalum praecox Walt. Fl. Carol. 75. 1788. No locality given, presumably from South Carolina. The type specimen, so far as known, is not in existence, not being in the Walter Herbarium in the British Museum.⁴⁴ The brief description is hardly sufficient to identify the species, but it does not disagree with the species to which Michaux,⁴⁵ Elliott,⁴⁶ and subsequent authors applied it. Walter does not mention the leaves; Michaux describes the plant, and Elliott the leaves, as glabrous.

DESCRIPTION

A slender erect perennial, consisting of small tufts of 1, rarely 2 or 3, flowering culms and, in spring, 1 to several leafy shoots arising from short scaly rhizomes, these shoots flowering in late summer and autumn and producing few to several short rhizomes with loose overlapping scales; culms simple, compressed, glabrous, 0.5 to 1 meter tall; sheaths compressed-keeled, the lower overlapping, commonly purplish, glabrous or the lower, especially of the young shoots, silky villous, rarely the others pilose at the summit; ligule brown, about 3 mm. long; blades usually folded at base, flat above, rather firm, ascending, 10 to 30 cm., commonly 15 to 25 cm., long, 3 to 7 mm. wide, the uppermost reduced, glabrous or sometimes pilose on the upper surface toward the base; racemes 2 to 8, commonly 4 to 6, narrowly ascending to arcuate-spreading, 2 to 7 cm. long, the common axis very slender; rachis about 1.5 mm. wide, purplish, pilose at the narrowed base; spikelets solitary or in pairs, commonly both in the

⁴⁴ See Hitchcock, Ann. Rep. Mo. Bot. Gard. 16: 42. 1905.

⁴⁵ Fl. Bor. Amer. 1: 44. 1803.

⁴⁶ Bot. S. C. & Ga. 1: 106. 1816.

same raceme, usually crowded, strongly flattened, 2.2 to 2.8 mm. long, 2 to 2.3 mm. wide, suborbicular, glabrous, yellowish green or purple-tinged; glume and sterile lemma equal, 5-nerved (lateral pair obscure), thin and fragile, under a lens minutely papillose-striate; fruit nearly the size and form of the spikelet, pale, under a lens strongly papillose.

DISTRIBUTION

Wet pine barrens, borders of cypress swamps, moist places in flatwoods, and wet savannas, in the Coastal Plain, North Carolina to central Florida and along the Gulf to Texas.

NORTH CAROLINA: Craven County, *McCarthy* in 1884. Wilmington, *Hitchcock* 224; *Kearney* 280. Between Greenville and Masonboro, *Chase* 4598. Commissary, *Chase* 7182. Without locality, *Delile*.

SOUTH CAROLINA: Sumter County, *Stone* 377.

GEORGIA: Rome, *McCarthy* in 1888. Jessup, *Kearney* in 1893. Manor, *Tabor* 40.

FLORIDA: Suwanee County, *Hitchcock* 2500. Jacksonville, *Combs* 24; *Curtiss* 3569 in part, 4024, 4744 and in 1875; *Kearney* 143. Baldwin, *Combs* 62. Pablo Beach, *Chase* 7046. Duval County, *Fredholm* 5232; *J. D. Smith* 572. Lockhart, *Baker* 320. Grasmere, *Combs & Baker* 1142. Kissimmee, *Swallen* 275. Kicco, *Piper* in 1921. Without locality, *Chapman*; *Rugel* 368.

ALABAMA: Mobile, *Kearney* 54; *Mohr* in 1884.

MISSISSIPPI: Mississippi City, *J. D. Smith* 664. Beauvoir, *Tracy* 4500. Biloxi, *Tracy* 2026, 2048, 3666, 3867, 4499; *Tracy & Ball* 25, 26.

TEXAS: Hempstead, *Hall* 805. Without locality, *Nealley* 1886.

112. *Paspalum lentiferum* Lam.

Paspalum lentiferum Lam. Tabl. Encycl. 1: 175. 1791. "E Carolina D. Fraser." The type specimen, bearing the name in Lamarck's script, in the Lamarck Herbarium in Paris, is part of a single culm, 45 cm. long, with four racemes. The single leaf present is glabrous.

Paspalum lanuginosum Bosc; Beauv. Ess. Agrost. 12, 1812, nomen nudum. In the DeCandolle Herbarium is a specimen so named in Bosc's script, collected by him in Carolina. The sheaths are loosely silky-pilose.

Paspalum lanuginosum Willd.; Steud. Nom. Bot. ed. 2. 2: 271, 1841, as synonym of *P. lentiferum* Lam. Not *P. lanuginosum* Nees, 1829. In the Willdenow Herbarium is a specimen collected by Bosc, doubtless the same collection as that so named by Bosc himself (see paragraph above).

Paspalum curtisianum Steud. Syn. Pl. Glum. 1: 26. 1854. "M. A. Curtis legit in Carolina." The type specimen in the Steudel Herbarium, in the Paris Herbarium, bearing the name in Steudel's script, consists of two plants, one with two, the other with three racemes. The lower sheaths and lower part of the blades are softly villous.

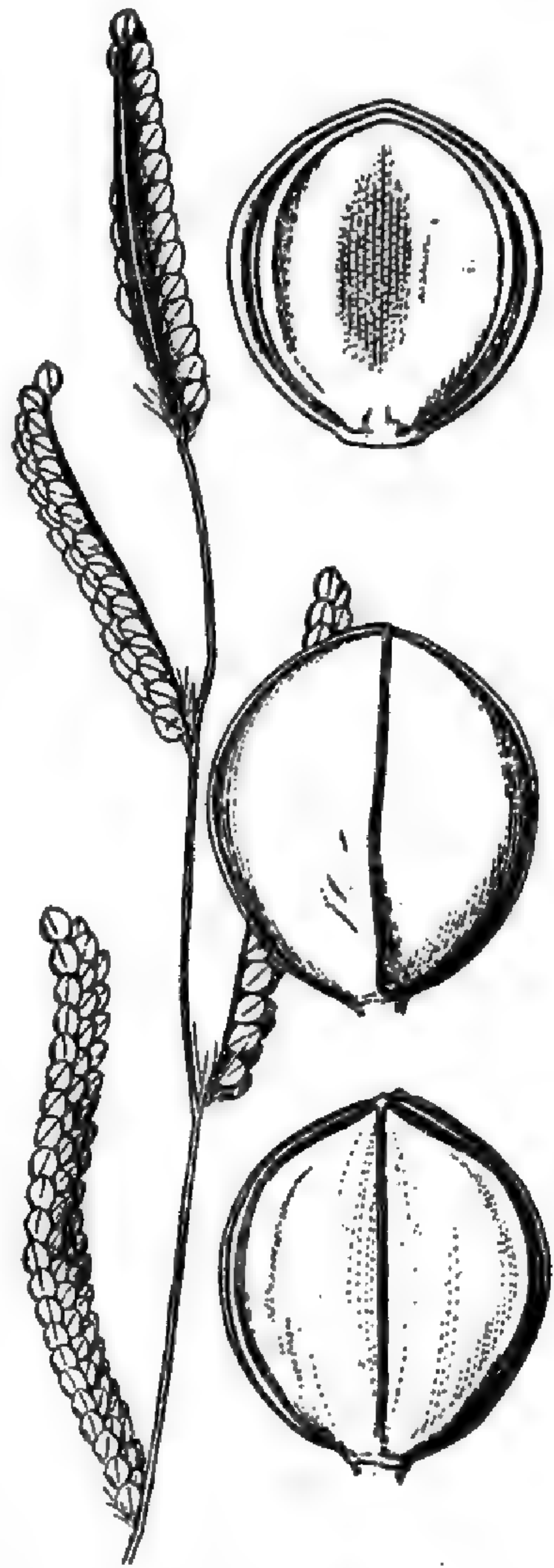


FIGURE 113.—*P. praecox*. From *Stone* 377

Paspalum praecox var. *curtisianum* Vasey, Bull. Torrey Club 13: 165. 1886. Based on *P. curtisianum* Steud.

Paspalum glaberrimum Nash in Small, Fl. Southeast. U. S. 76, 1326. 1903. "Type, Nash, Pl. Cent. Penins. Fla., no. 1619, in Herb. Nash." This specimen, now in the herbarium of the New York Botanical Garden, is a rather stout plant with sheaths pilose at the junction with the blade and blades pilose on the upper surface, the plant otherwise glabrous.

Paspalum tardum Nash in Small, Fl. Southeast. U. S. 76, 1326. 1903. "Type, Nash, Pl. Fla. no. 2047, 1895, in Herb. Nash." This specimen, now in the herbarium of the New York Botanical Garden, is a slender plant with blades pilose on the upper surface, glabrous beneath, and sheaths, except the lowermost, glabrous or sparsely papillose-pilose near the margin and summit.

Paspalum kearneyi Nash in Small, Fl. Southeast. U. S. 77, 1326. 1903. "Type, Nicholson, Miss., Kearney, no. 357, 1896, in Herb. C. U. [Columbia University]." The type is slender, like that of *P. tardum*, but the blades are conspicuously

pilose on both surfaces; the spikelets are 3 mm. long, but oval rather than orbicular.

Paspalum amplum Nash in Small, Fl. Southeast. U. S. 77, 1326. 1903. "Type, Marianna, Fla., Tracy, no. 3682, 1897, in Herb. Nash." This specimen, now in the herbarium of the New York Botanical Garden, is about 90 cm. tall, the lower sheaths appressed-villous, the others sparsely pilose at the summit, otherwise glabrous, the blades elongate, pilose at the base and short-pubescent on the upper surface.

The species described by LeConte⁴⁷ as *Paspalum virgatum* is, as shown by specimens from him in the Paris and Berlin herbaria, *P. lentiferum*. LeConte credits the name to Walter and cites *P. plicatulum* Michx. as a synonym. The description shows that LeConte must have confused the two species.

DESCRIPTION

An erect perennial of the same habit as *P. praecox*, the culms less slender than in that, sometimes robust and as much as 1.5 meters tall, the rhizomes on the average more numerous; sheaths usually not so strongly keeled as in *P. praecox*,

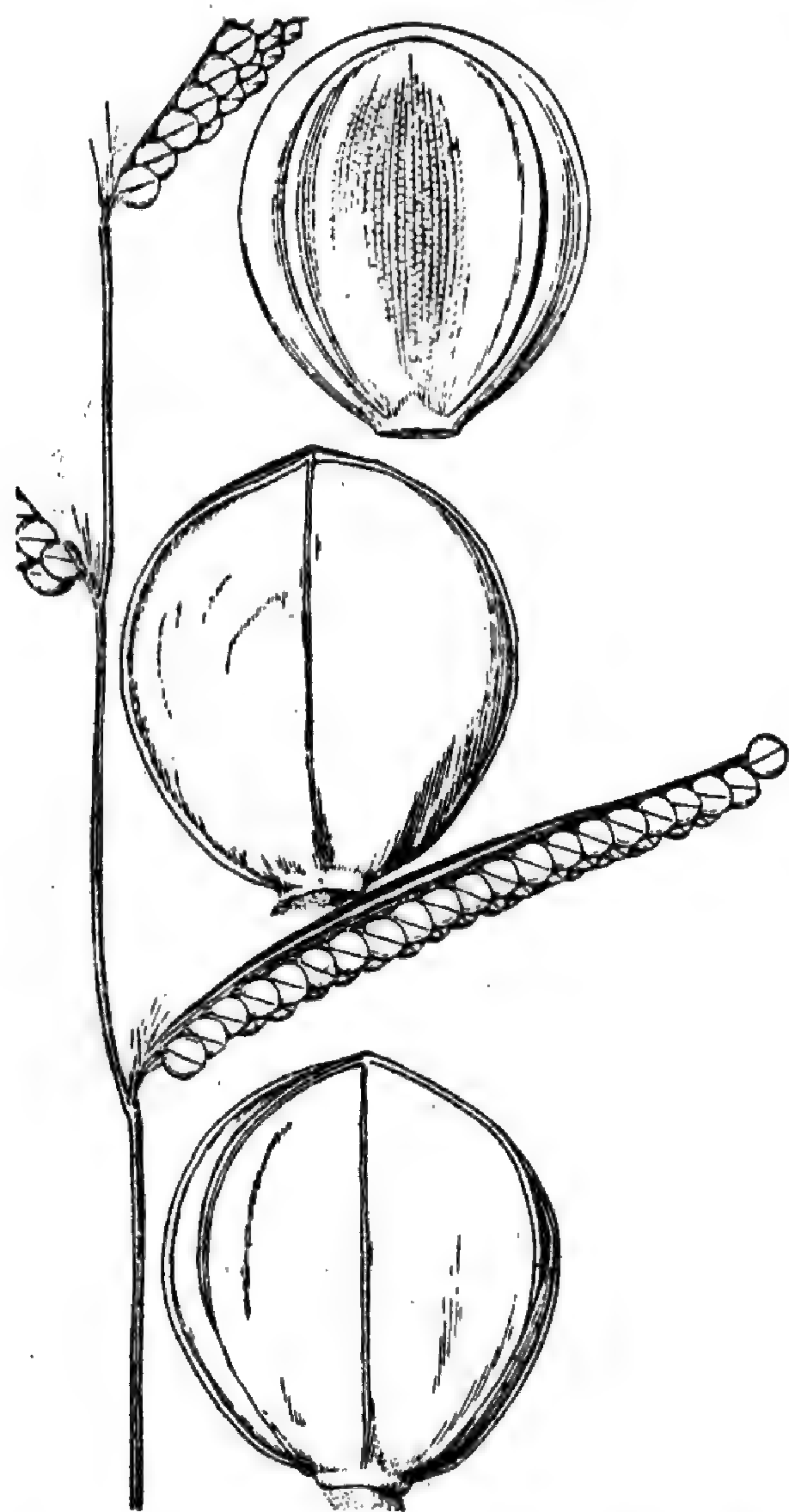


FIGURE 114.—*P. lentiferum*. From Harper 1629

from densely silky-villous, especially the lower ones, to glabrate; ligule brown, about 3 mm. long; blades firm, flat above or folded throughout, sometimes flexuous, ascending, 15 to 50 cm. long, 3 to 10 mm. wide, the uppermost reduced,

⁴⁷Journ. de Phys. 91: 284. 1820.

pilose, often conspicuously so, on both surfaces, or glabrous beneath, occasionally glabrate on the upper surface except at the base; racemes 2 to 9, commonly 4, or 5, usually spreading at maturity, 3 to 10 cm. long; rachis 1.5 to 1.7 mm. wide, pilose at the narrowed base; spikelets solitary or, more commonly, in pairs, usually crowded, 2.7 to 3.4 mm. long, broadly oval to orbicular, the glume and lemma in color, texture, and nerving like those of *P. praecox*.

This variable species intergrades with *P. praecox*, from which it is here delimited by the more robust culms, pilose foliage, and larger spikelets, but these three characters are not always found in the same specimen. The types of *P. tardum* and *P. kearneyi* are slender specimens approaching the intergrading forms.

DISTRIBUTION

Moist pine barrens, borders of flatwoods, and cypress swamps, and in savannas on the Coastal Plain, from North Carolina to southern Florida and along the Gulf to Texas.

NORTH CAROLINA: Wilmington, *Chase* 4606; *Hitchcock* 3892.

GEORGIA: Stone Mountain, *Hitchcock* 3893. Wrightsville, *Harper* 1335. Bulloch County, *Harper* 900. Coffee County, *Harper* 672. Cornelia, *Harper* 1486. Empress, *Harper* 1629.

FLORIDA: Avondale, *Combs* 485. Milton, *Chase* 4319; *Swallen* 446. Bay Head, *Combs* 632, 638. Apalachicola, *Chapman* (*Biltmore Dist.*) 3048a. Aspalaga, *Chapman* (*Biltmore Dist.*) 6075a. Lake City, *Rolfs* 767. Jacksonville, *Curtiss* 3569 in part, 3573 in part, 4990 in part, 5194, 5580. Pablo Beach, *Combs* 45. New River, *Hitchcock* 2498. Ellzey, *Combs* 815, 819. Crystal, *Combs* 1026. Homosassa, *Combs* 974, 975. Eustis, *Nash* 1619, 2047. Grasmere, *Combs & Baker* 1158. Fellsmere, *Tracy* 9388. Sanford, *Chase* 4038. Fort Florida, *Hood* 6. Eau Gallie, *Curtiss* 5728. Brevard County, *Fredholm* 6056, 6150. Titusville, *Chase* 3998. Kissimmee, *Swallen* 276. Osceola County, *Fredholm* 5950. Hernando County, *Hitchcock* 2505. Tampa, *Garber* in 1876. Bartow, *Combs* 1194½, 1202, 1229. Arcadia, *Combs* 1276. Fort Myers, *Hitchcock* 500, 3894; *Standley* 12975, 13073, 19042; *J. P. Standley* 117; *Westgate* 3460, 3621. Lemon City, *Eaton* 647. Without locality, *Chapman*; *Fredholm* 5232a; *Simpson* in 1889.

ALABAMA: Mobile, *Mohr* (*Herb. Geol. Surv.*) 1803; *Tracy* 6737. Baldwin County *Mohr* in 1878 and 1893.

MISSISSIPPI: Waynesboro, *Kearney* 132, 172. Nicholson, *Kearney* 357. Bay St. Louis, *Langlois* 22. Beauvoir, *Tracy* 4500. Biloxi, *Tracy* 3665, 3666a, 3744, 3865; *Tracy & Ball* 27. Ocean Springs, *Kearney* 290; *Tracy* 116, 117, 154. Scranton, *Pollard* 1206. Horn Island, *Tracy* 2864, 4627, 6472, 7401.

LOUISIANA: Oberlin, *Ball* 188. Covington, *Arsène* 11013, 11015, 11327, 12568. New Orleans, *Drummond* 443. Lake Charles, *Allison* 258; *Tracy* 3683.

TEXAS: Hardin County, *Tharp* 3105. Houston, *Hall* 806. Harris County, *Thurow* in 1888. Without locality, *Nealley* in 1884.

113. *Paspalum erectum* Chase, sp. nov.

DESCRIPTION

A slender tufted erect perennial; culms simple, about 1 meter tall, glabrous; nodes glabrous; sheaths overlapping, long-pilose toward the summit, sometimes densely so at the junction with the blade, the upper glabrous, the prophylla of the basal sheaths large and firm; ligule delicate-membranaceous, lacerate, a dense ring of long white hairs back of it; blades folded, ascending from an erect base,

15 to 30 cm. long, 2 to 5 mm. wide, the uppermost rudimentary, long-pilose toward the base on the upper surface, the margins very scabrous; racemes 4 or 5, erect or narrowly ascending, 4.5 to 8 cm. long, the slender rather stiff common axis 8 to 10 cm. long; rachis 1 mm. wide, scabrous and with a few long hairs at the base; spikelets in pairs, crowded, on minute scabrous pedicels, 2.8

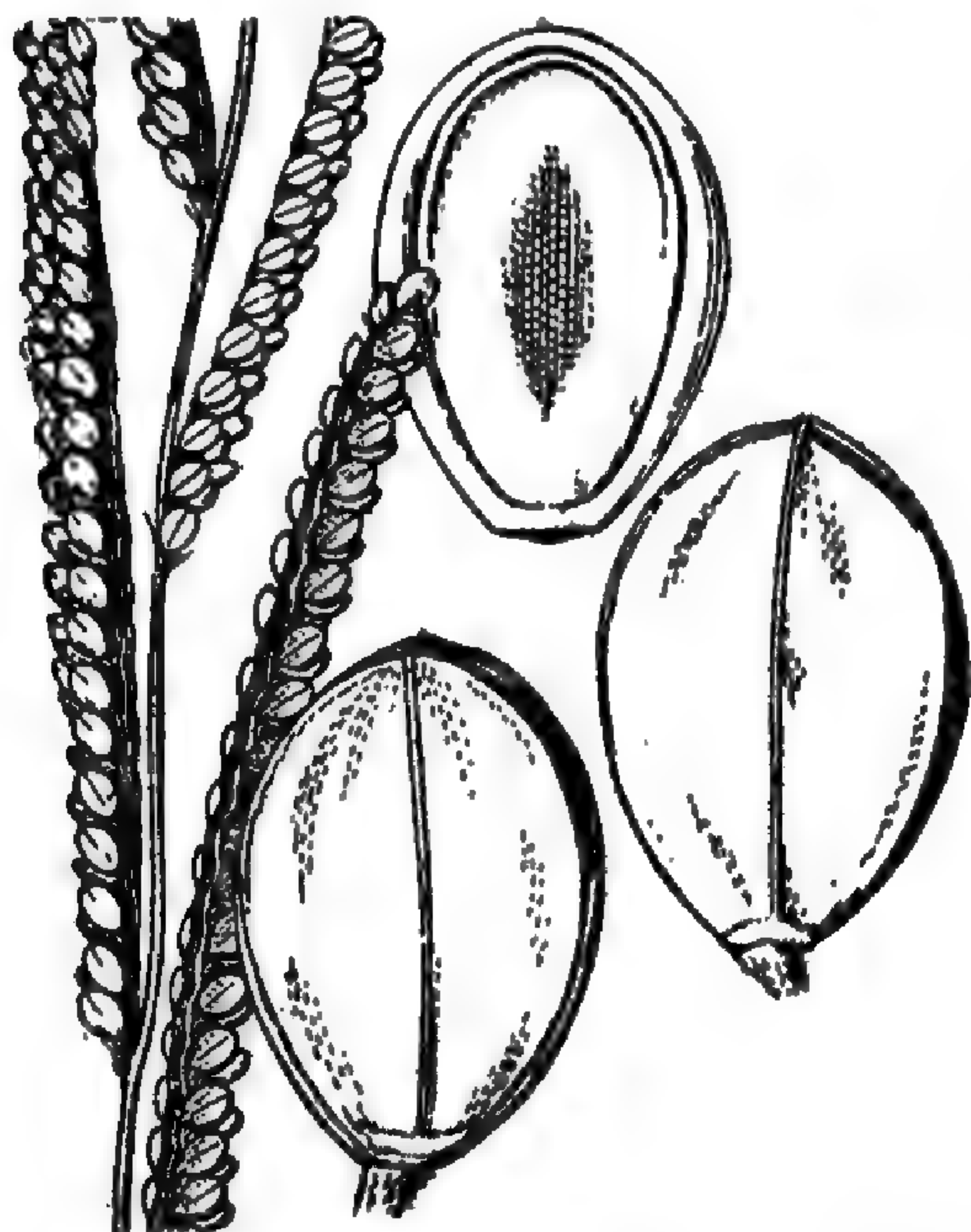


FIGURE 115.—*P. erectum*. From type specimen

mm. long, 2 mm. wide, rounded-obovate, depressed-convex on the back, pale, mostly tinged with faded purple, glabrous; glume and sterile lemma equal, 5-nerved, the marginal ones obscure, under a lens minutely papillose-roughened; fruit pale, papillose-striate.

Type in the U. S. National Herbarium, no. 929913, collected in prairie, Alzada, Colima, Mexico, altitude 450 meters, September 21, 1910, by A. S. Hitchcock (no. 7078).

This is the collection referred to *Paspalum glaberrimum* Nash by Chase in Hitchcock's Mexican Grasses.⁴⁸

Floridana.—Mostly robust perennials, with simple culms, flat blades, and heavy racemes of large turgid glabrous spikelets.

Culms erect or suberect, leafy throughout.

Glume and sterile lemma slightly inflated and wrinkled, green.

Sheaths and blades hirsute.....115. *P. floridanum*.

Sheaths and blades glabrous or nearly so. 115a. *P. floridanum glabratum*.

Glume and sterile lemma not inflated and wrinkled, rusty-tinged.

116. *P. giganteum*.

114. *Paspalum difforme* LeConte

Paspalum difforme LeConte, Journ. de Phys. 91: 284. 1820. Described from Georgia. There are two specimens so named in LeConte's script, one in the LeConte Herbarium in the Academy of Natural Sciences, Philadelphia, with three racemes, and one in the Paris Herbarium, with two inflorescences, one of these with 3, the other with 4 racemes. LeConte's description reads "spicis 3-4," for which reason the Paris specimen is taken as the type. By a typographical error the specific name is spelled "Clifforme."

DESCRIPTION

An ascending perennial, the culms solitary or few from a short knotty rhizome usually with a few leafy sterile shoots at base; culms simple, 35 to 75 cm. tall, rarely taller, compressed, glabrous; nodes glabrous; leaves commonly crowded at the base, the upper blade usually below the middle of the culm, the upper sheath bladeless; sheaths keeled, glabrous or pilose on the keel and margin, or the lowermost sometimes pilose throughout, the lower short and overlapping, the upper elongate; ligule rather firm, about 2 mm. long; blades flat from a folded base, firm, commonly stiffly ascending at a uniform angle, 7 to 25 cm., commonly 10 to 15 cm., long, 5 to 10 mm. wide, pilose on the upper surface toward the base,

⁴⁸ Contr. U. S. Nat. Herb. 17: 236. 1913.

sometimes to the apex, rarely pilose on both surfaces, or glabrous; racemes 2 or 3, rarely 1 or 4, ascending to suberect, thick, 3.5 to 8 cm., rarely 10 cm., long, the common axis slender; rachis about 1 mm. wide, pilose at the base, occasionally sparsely ciliate to near the summit, commonly strongly zigzag; spikelets in pairs (one of the pair sometimes rudimentary), usually crowded, 3.5 to 4 mm. long, about 3 mm. wide, oval to obovate, turgid; glume and sterile lemma equal, covering the fruit at maturity, firm and papery, somewhat inflated and irregularly wrinkled, 5-nerved, the lateral nerves obscure; fruit 3 to 3.5 mm. long, 2.3 to 2.5 mm. wide, pale or tawny.

This species is closely related to *P. floridanum* and a few of the more pubescent specimens approach that species.

DISTRIBUTION

Moist sandy soil in open ground and in flatwoods, in the Coastal Plain, Georgia, to Orange County, Florida, and west near the Gulf to Louisiana.

GEORGIA: Thalman, *Chase* 7060.

FLORIDA: Suwanee County, *Hitchcock* 3895. Wewahitchka, *Chapman* (*Biltmore Dist.*) 3044b in part. Jacksonville, *Curtiss* 5021; *Hitchcock* 3896. Duval County, *Curtiss* 3570.

Orange Bend, *Chase* 4110.

ALABAMA: Tuskegee, *Carver* 83. Mobile, *Kearney* 38; *Mohr* in 1883, 1888, 1891, and 1892.

MISSISSIPPI: Bay St. Louis, *Langlois* 20. Biloxi, *Chase* 4347½; *Tracy & Ball* 32. Ocean Springs, *Kearney* 296; *Tracy* 100.

LOUISIANA: Covington, *Arsène* 11777.

115. *Paspalum floridanum* Michx.

Paspalum floridanum Michx. Fl. Bor. Amer. 1: 44. 1803. "Hab. in Florida et Georgia." The type, in the Paris Herbarium, is a single scarcely mature plant about 60 cm. tall, the lowermost sheaths pubescent, the others glabrous, the three erect racemes about 6 cm. long. The label reads "*Paspalum floridanum*, Georgia et Florida."

Paspalus macrospermus Flüge, Monogr. Pasp. 172. 1810. "In Carolina legit Oculatissimus Bosc." The type has not been located. In the Vahl Herbarium in the Copenhagen Herbarium is a Bosc specimen from Carolina so named which agrees with Flüge's description and may be part of the type collection. In the Willdenow Herbarium a specimen of *Paspalum boscianum* is labeled "*Paspalum glabrum*" with "*macrospermum*" added. Flüge cites "*Pasp. glabrum* Bosc ined." as synonym, but this specimen does not agree with Flüge's description.

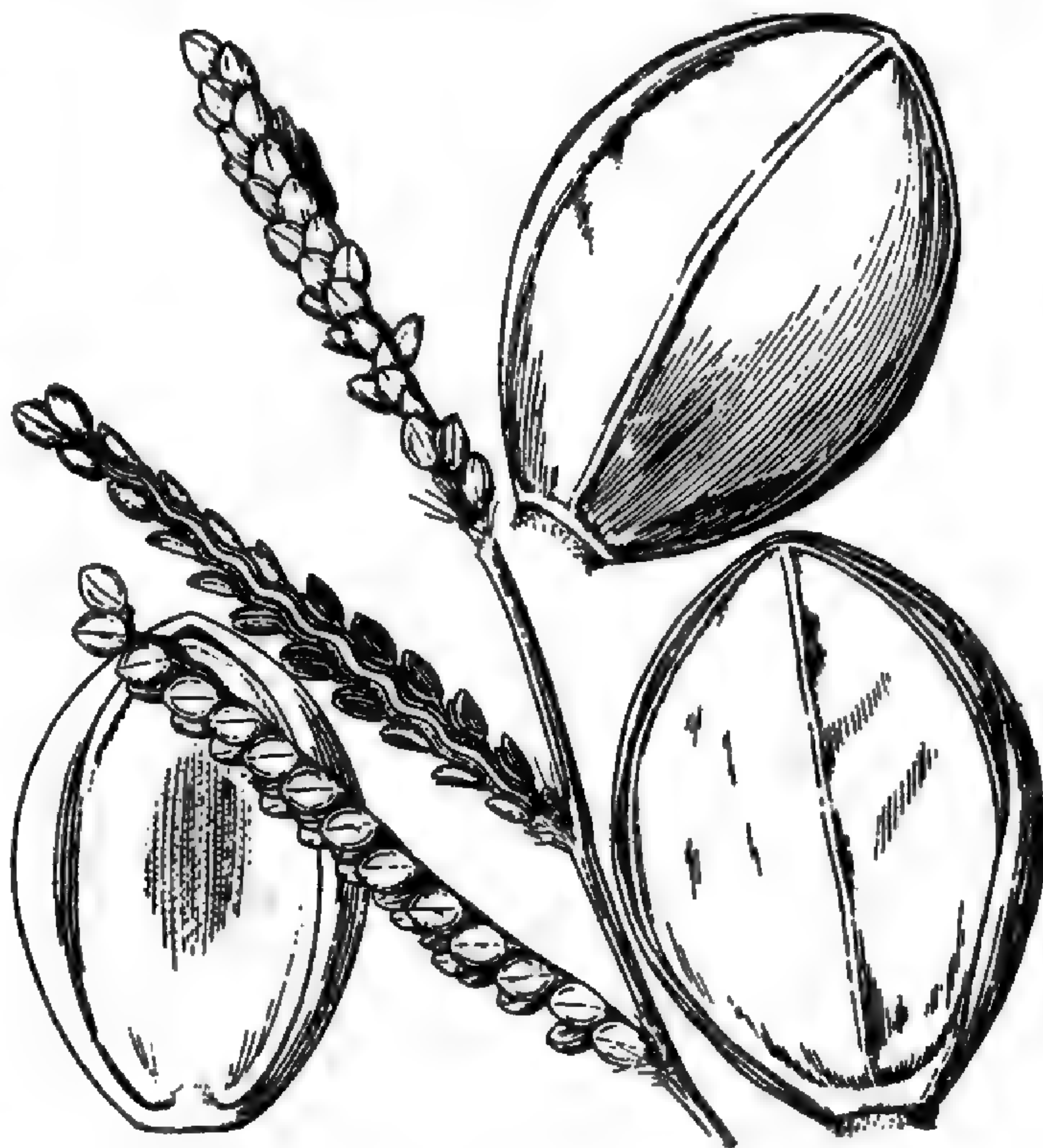


FIGURE 116.—*P. difforme*. From type specimen

Paspalum glabrum Bosc; Flüge, Monogr. Pasp. 172. 1810, as synonym of *P. macrospermum*. Bosc's specimen so labeled in the herbarium of Padua is *P. floridanum*. Bosc sent out other species under this name. Two of his specimens so named are in the Delessert Herbarium; one is *P. lentiferum*, the other *P. laeve*. One in the Florence Herbarium and another in the Willdenow Herbarium are *P. boscianum*.

Paspalum laevigatum Bosc; Poir. Encycl. Suppl. 4: 313, 1816, as synonym of *P. floridanum*.

Paspalum laeve var. *floridanum* Wood, Class-book 782. 1861. Presumably based on *P. floridanum* Michx., though only *P. macrospermum* Flüge is cited as synonym.

DESCRIPTION

An erect perennial, the culms solitary or few together from short stout scaly rhizomes, simple, from rather slender to stout, 0.8 to 2 meters, commonly 1 to 1.5 meters, tall, compressed, glabrous; leaves rather numerous, several crowded

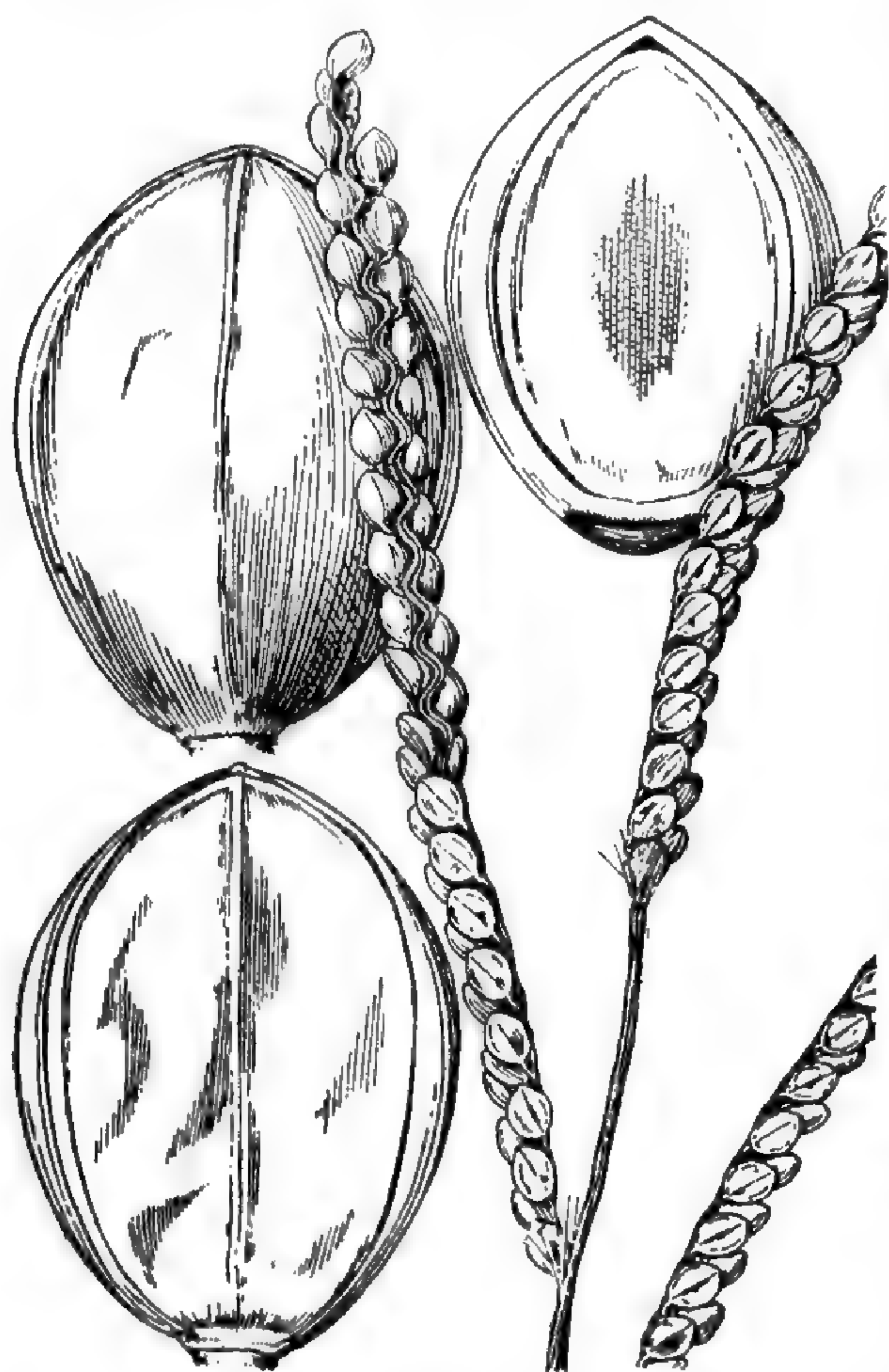


FIGURE 117.—*P. floridanum*. From type specimen and Chase 4221

at the base, the sheaths, especially the lower, mostly overlapping, keeled, from nearly or quite glabrous to densely rather harshly tawny-villous; ligule firm, 2 to 3 mm. long; blades firm, commonly folded at base and flat above, sometimes folded throughout or subinvolute, mostly ascending or with the summits spreading, 12 to 50 cm. long, 4 to 10 mm. wide, the upper reduced, from at least pilose on the upper surface at base to densely villous like the sheaths, usually villous on the upper surface and glabrate beneath; racemes usually 2 to 4, sometimes 5 or 6, rarely more or solitary, 4 to 12 cm. long, thick, usually suberect or ascending, or the whole inflorescence slightly nodding, the common axis slender; rachis 1 to 1.5 mm. wide, usually strongly zigzag, pilose at the base, scabrous and sometimes sparsely long-ciliate throughout; spikelets in pairs (one of the pair sometimes rudimentary), crowded, 3.6 to 4 mm. long, 2.8 to 3.1 mm. wide, usually 4 mm. long and 3 mm.

wide, oval, pale; glume and sterile lemma equal, scarcely covering the fruit at maturity, firm and papery, slightly inflated, irregularly wrinkled, 5-nerved; fruit about 3.5 mm. long and 2.5 mm. wide, oval, light brown, under a lens minutely papillose-striate.

Tracy's no. 3689 consists of several large plants approaching var. *glabratum*, in which several of the racemes are forked.

DISTRIBUTION

Low moist sandy soil, pine woods, flatwoods, savannas, and low prairies, in the Coastal Plain from Virginia to central Florida and along the Gulf to Texas, and north in the valleys to Missouri and Oklahoma.

- MISSOURI: Webb City, *Palmer* 970.
- VIRGINIA: Parhams Point, *Word* in 1885. Williamsburg, *Grimes* 3218. Dismal Swamp, *Chase* 3644. Norfolk, *Jensen* in 1906. Clapham Junction, *Mackenzie* 1718. Princess Anne County, *Kearney* 2168.
- NORTH CAROLINA: Bolton, *Heller* 14117. Wilmington, *Hitchcock* 3898; *Kearney* 262; *McCarthy* in 1885. Between Greenville and Masonboro, *Chase* 4587. Without locality, *McCarthy* in 1884.
- SOUTH CAROLINA: Aiken, *Ravenel* in 1869 and 1882. Florence, *Ball* 688. Orangeburg, *Hitchcock* 29. Floyds, *Norton* 358c.
- GEORGIA: Thomasville, *Tracy* 3671. Americus, *Tracy* 3668. Sumter County, *Harper* 477. Savannah, *Kearney* 179. Ruskin, *Ricker* 910.
- FLORIDA: Avondale, *Combs* 492. De Funiak Springs, *Combs* 471. Chipley, *Combs* 540, 594. Bay Head, *Combs* 636, 637. Marianna, *Tracy* 3669. Wewahitchka, *Chapman* (*Biltmore Dist.*) 3044b. Chattahoochee, *Tracy* 3676, 3684. Monticello, *Combs* 343a. Madison, *Combs* 239. Lake City, *Rolfs* 820. Jacksonville, *Curtiss* 5517, 5750; *Kearney* 149, 151, 153, 165. Hastings, *Tracy* 8848. Waldo, *Combs* 701. Gainesville, *Chase* 4221. Levy County, *Hitchcock* 2508. Orange Bend, *Chase* 4109.
- TENNESSEE: Jackson, *Bain* 183.
- ALABAMA: Selma, *Kearney* 13. Chehaw, *Hitchcock* 3897. Tuskegee, *Carver* 89. Bolling, *J. D. Smith* in 1884. Tensaw, *Tracy* 8024. Spring Hill, *Bush* 334. Mobile, *Kearney* 37, 55; *Mohr* in 1878, 1884, 1888, 1890, and 1896. Without locality, *Winchell* 333.
- MISSISSIPPI: Lake, *Tracy* 1560. Waynsboro, *Kearney* 143. Nicholson, *Kearney* 345. Bay St. Louis, *Langlois* 21. Biloxi, *Chase* 4326, 4329½, 4347; *Kearney* 205, 239; *Ricker* 852; *Tracy* 2040, 3689, 3690, 3692, 3694, 3743; *Tracy & Ball* 28, 29, 31; *Tracy & Lloyd* 450. Ocean Springs, *Kearney* 289; *Pollard* 1100; *Tracy* 23, 130, 7016. Bayou Porto, *Tracy* 4505. Cat Island, *Tracy & Lloyd* 435.
- ARKANSAS: Texarkana, *Letterman* in 1894. Fayetteville, *Hitchcock* 16079. Fulton, *Bush* 1049. Northwest Arkansas, *Harvey* 17, 18, and in 1884.
- LOUISIANA: Oberlin, *Ball* 186. Calcasieu, *Cocks* 2197. Calhoun, *Ball* 38. Alexandria, *Ball* 171. Lake Charles, *Allison* 51; *Chase* 4390; *Tracy* 3664. Covington, *Arsène* 11137, 11156, 11259, 11512, 11710, 12518, 12538, 12572; *Wurzlów* in 1913.
- TEXAS: Weatherford, *Tracy* 8212. Fort Worth, *Hitchcock* 16137. Lake Worth, *Ruth* 1000. Dallas, *Reverchon* in 1900. Texarkana, *Heller* 4194. Bowie County, *Eggert* in 1896. Longview, *Letterman* in 1881. Hardin County, *Tharp* 3097. Houston, *Fisher* 110, 257. Waller County, *Thurrow* in 1898. Pierce, *Tracy* 7398. Brazos County, *Nealley* 89 in 1882.
- OKLAHOMA: Miami, *Stevens* 2302. Stillwater, *Featherly* in 1895.

115a. *Paspalum floridanum glabratum* Engelm.

?*Paspalum altissimum* LeConte, Journ. de Phys. 91: 285. 1820. "Habitat prope Salem Carolinae borealis." The specimen in the herbarium of the Academy of Natural Sciences, Philadelphia, bearing a ticket in LeConte's handwriting "*Paspalum altissimum* mihi," is a slender plant about 1.2 meters tall, with 2 racemes, blades pilose on the upper surface, and sheaths mostly pilose along the margin. This plant, referable to *P. floridanum*, does not agree with LeConte's description "Glabrum, * * * spicis 4-5 alternis * * * Gramen rigidum, quinque pedale," and is not taken as the type.⁴⁹ No other specimen so named by

⁴⁹ See footnote, p. 32.

LeConte has been found. The description would appear to have been drawn from such a plant as *Small & Heller* 200, from North Carolina, or from a tall, less conspicuously pubescent plant of *P. floridanum*, such as *Hitchcock* 29 from South Carolina. Because of the uncertainty this name is not taken up for the subspecies.

Paspalum laeve var. *altissimum* Wood, Class-book 782. 1861. Based on *P. altissimum* LeConte.

Paspalum floridanum var. *glabratum* Engelm.; Vasey, Bull. Torrey Club 13: 166. 1886. No specimen nor locality is cited. In the United States National Herbarium are three specimens bearing this name in Vasey's script. Of these a complete plant collected by Doctor Mohr at Mobile, Ala., June, 1884, is selected as the type, the other two specimens lacking the base.

Paspalum glabratum Mohr, Bull. Torrey Club 24: 21. 1897. Based on *Paspalum floridanum* var. *glabratum* Engelm.

DESCRIPTION

More robust and taller than the species, sometimes geniculate at base, often producing a flowering branch from one of the middle nodes late in the season; foliage glabrous or pilose near the junction of the sheath and blade only, or the lowermost sheaths pilose; blades commonly less firm, longer and more often flat throughout; racemes on the average longer, usually more spreading.

Extreme specimens of this form appear quite distinct from the typical rather slender *P. floridanum* with villous foliage, but there are many plants with villous foliage as large as or larger than many of the glabrous plants referred to this subspecies. Besides these there are several tall robust plants with long spreading racemes, which have foliage conspicuously villous. Among the latter are *Bain* 183, *Noyes* 106, and *Tracy & Lloyd* 435. It might be better to include all under *P. floridanum*, but the extremes are so striking and relatively so numerous that it is more convenient to have distinct names for them.

DISTRIBUTION

Brackish marshes and low, sandy, mostly open ground, southern New Jersey to central Florida, west to Texas and southeastern Kansas.

NEW JERSEY: Cold Spring, *Pennell* 2168. Cape May, *Parker* in 1882.

KANSAS: Cherokee County, *Hitchcock* 873.

DELAWARE: Sussex County, *Commons* in 1875.

MARYLAND: Annapolis, *Bartlett* 3068. Anne Arundel County, *J. D. Smith* in 1879. Bay Ridge, *Scribner* in 1897. Ocean City, *Canby*; *Commons* 310. Eastern Shore, *Canby*.

VIRGINIA: Dismal Swamp, *Chase* 3645. Cape Charles City, *Canby & Rose* 805. Princess Anne, *Kearney* 2142.

NORTH CAROLINA: Heiligs Mill, *Small & Heller* 200. Salisbury, *Biltmore Herb.* 3044a. Raleigh, *Ashe*. Wadesboro, *J. D. Smith* in 1884. Columbus County, *McCarthy* in 1884. Eastern North Carolina, *McCarthy* in 1884 and 1885.

SOUTH CAROLINA: Lexington, *Corley* in 1879.

GEORGIA: Floyd County, *Chapman*. Thompsons Mills, *Allard* in 1908. Sumter County, *Harper* 623. Savannah, *Kearney* 185.

FLORIDA: Avondale, *Combs* 490. Bay Head, *Combs* 635. Monticello, *Combs* 343. Jacksonville, *Combs* 18; *Kearney* 161. Duval County, *Fredholm* 155. Homosassa, *Combs* 986. Orlando, *Baker* 300; *Combs* 1174.

ALABAMA: Eufala, *McCarthy*. Mobile, *Kearney* 56; *Mohr* 44 in 1884.

MISSISSIPPI: Starkville, *Chase* 4443; *Kearney* 66. Biloxi, *Chase* 4329; *Tracy* 2049, 3690, 3691, 3693, 3795, 8602; *Tracy & Ball* 30. Ocean Springs, *Pollard* 1118; *Tracy* 118.

ARKANSAS: Miller, *Eggert* in 1896.

TEXAS: Polytechnic, *Ruth* 258. Handley, *Ruth* 259. Terrell, *Hitchcock* 9213. Lake Worth, *Ruth* 1442. Greenville, *Tharp* 2012. Mineola, *Letterman* in 1882. Upshur County, *Palmer* 31721. Ennis, *Smith* in 1897. Troup, *Letterman* in 1882. College Station, *Hitchcock* 3899. Waller County, *Thurrow* in 1898. Houston, *Hall* 811. Wallisville, *Wallis* in 1879. Columbia, *Bush* 311. Galveston, *Hitchcock* 9214. Without locality, *Nealley* in 1886; *Reverchon* in 1879; *Wright*.

OKLAHOMA: Limestone Gap, *Butler* 20.

116. *Paspalum giganteum* Baldw.

Paspalum giganteum Baldw.; Vasey, Bull. Torrey Club 13: 166. 1886. No specimen nor locality is cited. In the United States National Herbarium is a specimen labeled in Vasey's handwriting "*Paspalum giganteum* Bald. in Herb. Phil. Acad." This was collected at "Pablo Creek, E. Florida," by A. H. Curtiss in 1875. It is the upper part of a very tall plant with a single flat blade 45 cm. long and 2.3 cm. wide. This is evidently the basis of Vasey's description and is taken as the type. The four racemes are 18 to 23 cm. long. (An additional inflorescence of 3 racemes is mounted on the sheet.) The sheaths, the upper two only being present, are very sparsely papillose-pilose, and the blade is sparsely ciliate and bears a few scattered hairs on the upper surface. This pubescence on the upper leaves suggests that the plant probably had pilose lower sheaths.

Paspalum longicilium Nash, Bull. N. Y. Bot. Gard. 1: 435. 1900. "Collected by the writer [G. V. Nash] at Eustis, Lake Co. [Florida], July 16-31, 1894, no. 1359." The type, in the Herbarium of the New York Botanical Garden, is a robust plant more than 2 meters tall, the upper sheaths and blades sparsely pilose and ciliate as in the type of *P. giganteum*, the lower sheaths densely long-pilose. This name is erroneously listed as "*P. longissimum* Nash" by Schumann.⁵⁰

DESCRIPTION

A robust erect perennial, the culms mostly solitary, with one of two erect leafy shoots at base, from short scaly rhizomes, simple, erect, or the summit somewhat nodding, commonly 1.5 to 2 meters tall, sometimes taller, slightly compressed, sometimes as much as 8 mm. thick, glabrous; leaves rather numerous, the sheaths mostly overlapping, the lower commonly crowded, scarcely keeled, from glabrous to sparsely papillose-pilose, the lower sometimes densely so; ligule 2 to 3 mm. long, fragile; blades flat, relatively lax, ascending or spreading, elongate, sometimes as much as 60 cm. long (the lowermost shorter), commonly 10 to 23 mm. wide, slightly narrowed to the base, pilose on the upper surface above the ligule, otherwise glabrous or nearly so on both surfaces, the margins glabrous or sparsely ciliate with stiff ascending hairs; racemes commonly 3 or 4, sometimes 2, ascending, spreading, or somewhat drooping, 10 to 20 cm. long, occasionally longer, rarely less than 10 cm. long, the common axis slender; rachis about 1.5 mm. wide, scabrous on the margins and with a tuft of long hairs at the base, otherwise glabrous; spikelets in pairs, crowded, 3 to 3.8 mm. long, 2.5 to 3 mm. wide, commonly 3.5 mm. long and 2.6 mm. wide, oval to obovate, usually russet-tinged; glume and sterile lemma barely covering the fruit at maturity, thinner than in

⁵⁰ Just, Bot. Jahresb. 28: 1, 416. 1902.

P. floridanum, not papery and wrinkled, 5-nerved, glabrous, or with a few inconspicuous hairs at the summit of the glume; fruit nearly the shape and size of the spikelet, stramineous.



FIGURE 118.—*P. giganteum*. From type specimen

have no forage value, grazing animals avoiding them because of the cutting edges of the blades.

DISTRIBUTION

Moist sandy soil, open ground, stream banks, flatwoods, and hammocks, on the Coastal Plain from Georgia to southern Florida and along the Gulf to Mississippi.

GEORGIA: Without locality, *Baldwin*.

FLORIDA: Jacksonville, *Curtiss* in 1896.

Pablo Creek, *Curtiss* in 1875. Mouth of St. Johns River, *Curtiss* 3571.* Dunnellon, *Combs* 916. Homosassa, *Combs* 959. Daytona, *Francis* 3. Eustis, *Nash* 1208, 1359, 1754. Hernando County, *Hitchcock* 9217. Titusville, *Chase* 4025. Tampa, *Tracy* 6705. Manavista, *Tracy* 6717. Palmetto, *Tracy* 7035. Fort Myers, *Hitchcock* 499, 9215. Between Coconut Grove and Cutler, *Small & Carter* 1258. Sykes Hammock, *Small, Mosier & Small* 6764. Without locality, *Curtiss*; *Simpson* in 1890.

MISSISSIPPI: Biloxi, *Ricker* 853.

Virgata.—Tall robust perennials; blades firm with sharp-cutting edges; panicles of few to numerous racemes; spikelets in pairs, 2 to 3.9 mm. long. Mostly at low altitudes in tropical and subtropical America. These grasses

Spikelets pubescent, at least toward the summit; blades flat, more or less arcuate-spreading.

Fruit brown at maturity.

Spikelets obovate, obtuse.....117. *P. virgatum*.

Spikelets elliptic, subacute.....118. *P. conspersum*.

Fruit pale. Spikelets abruptly acute or subacute.

Rachis not ciliate; spikelets 3.5 mm. or more long....119. *P. acutum*.

Rachis conspicuously ciliate; spikelets less than 3 mm. long.

Lower sheaths reticulate, glabrous.....120. *P. plenum*.

Lower sheaths not reticulate, hirsute.....121. *P. nelsoni*.

Spikelets glabrous; blades V-shaped in cross-section, ascending.

Spikelets suborbicular, crowded; rachis ciliate.

Panicle not pyramidal, the racemes rarely more than 50; glume and sterile lemma rather firm in texture.....124. *P. millegrana*.

Panicle elongate-pyramidal, the racemes commonly more than 70, short and crowded at the summit; glume and sterile lemma fragile.

125. *P. densum*.

Spikelets obovate-elliptic; rachis not ciliate.

Racemes slender; spikelets not crowded; rachis 0.7 mm. wide.

122. *P. secans*.

Racemes thick, spikelets somewhat crowded; rachis 1 mm. wide.

123. *P. arundinaceum*.

117. *Paspalum virgatum* L.

Paspalum virgatum L. Syst. Nat. ed. 10. 2: 855. 1759. "Sloan. jam. t. 69. f. 2" is the only citation given. In the Linnaean Herbarium there is a specimen received from Jamaica, from Patrick Browne. This, examined in 1907 by A. S. Hitchcock,⁵¹ is taken as the type, since Linnaeus gives an original diagnosis of his own, citing Sloane's illustration only. It is the same species as the original of Sloane's figure.

Paspalus virgatus a linneanus Flüge, Monogr. Pasp. 189. 1810. Based on *P. virgatum* L.

Paspalus virgatus γ jacquinianus Flüge, Monogr. Pasp. 190. 1810. "Jacq. Ic. Tab. 11. * * * Insulae Caribaeae Jacquin." Jacquin's collection was not found in the Vienna Herbarium but in the Willdenow Herbarium is a specimen of *P. virgatum* received from Jacquin, which is probably the plant Flüge saw.

Paspalus virgatus δ willdenowianus Flüge, Monogr. Pasp. 190. 1810. "In locis siccis prope Param in Brasilia. Willdenow." This specimen collected by Hoffmannsegg, in the Willdenow Herbarium, is a robust plant occupying two sheets.

Paspalum virgatum var. *stramineum* Griseb. Fl. Brit. W. Ind. 543. 1864. "Trin. Ic. t. 131." Jamaica, March; and Antigua, Wulschlaegel, are also cited for the variety. Trinius' plate and the Wulschlaegel plant in the Grisebach Herbarium are *P. virgatum*; the March specimen in the Grisebach Herbarium is *P. arundinaceum* Poir. The description covers both. The name applies better to *P. arundinaceum*, though immature spikelets of *P. virgatum* are also straw-colored. Since two of the three citations refer to *P. virgatum* Grisebach's variety is referred to that, Wulschlaegel's specimen from Antigua being taken as the type.

Paspalum leucocheilum Wright, Anal. Acad. Cienc. Habana 8: 203, 1871; Fl. Cub. 194. 1873. "Isla de Pinos por el Sr. D. José Blain." The type, in the Gray Herbarium, is a small plant with an immature partly included panicle, the racemes erect, the spikelets puberulent throughout.

Paspalum virgatum var. *ciliatum* Doell in Mart. Fl. Bras. 2²: 88. 1877. "*Paspalum virgatum a Linneanus* Flüge 189, vix Linné Sp. pl. ed. II, 81." Linnaeus described the racemes as villous at the base and Doell renames Flüge's variety with rachis-margin pilose.

DESCRIPTION

A robust leafy perennial in large dense clumps, purplish below; culms simple, erect, or the outer curved at base, 1 to 2 meters tall, subcompressed, glabrous; nodes glabrous; sheaths elongate and overlapping, usually papillose-hirsute along the margin and on the collar, occasionally on the keel toward the summit, rarely pilose throughout, the lower spongy and succulent, reticulate in drying; ligule 1.5 to 2 mm. long; blades flat, ascending-recurved, 30 to 75 cm. long, 1 to 2.5 cm., rarely to 3 cm., wide (the uppermost much reduced), slightly rounded at base or narrowed to the width of the sheath, long-hirsute at the very base on the inside and often on the margin toward the base, otherwise glabrous, the margin serrulate; panicle slightly nodding, 12 to 40 cm., commonly 15 to 25 cm., long, of 3 to

⁵¹ See Hitchcock, Contr. U. S. Nat. Herb. 12: 116. 1908.

29, commonly 10 to 16, thick ascending to drooping racemes, the lower 5 to 15 cm., rarely 20 cm., long, the upper gradually shorter, the common axis angled, occasionally scabrous on the angles; rachis purplish, 1 to 1.5 mm. wide, with copious long white hairs at the base, the margin very scabrous and commonly with scattered long quill-like hairs; spikelets in pairs on angled pedicels, crowded, 2.2, rarely to 3, mm. long, 1.8 to 2.3 mm. wide, obovate, grayish, drying yellowish to rusty or purplish brown; glume and sterile lemma equal, rather loose, 5-nerved, one or both often minutely apiculate, the glume pubescent with silky hairs along the margin, at least toward the summit, otherwise from glabrous to rather densely puberulent, the lemma glabrous to puberulent, occasionally with short silky hairs along the margin toward the summit, the sterile palea occasionally developed; fruit 2 to 2.2 mm. long, chestnut-brown at maturity, papillose-striate.

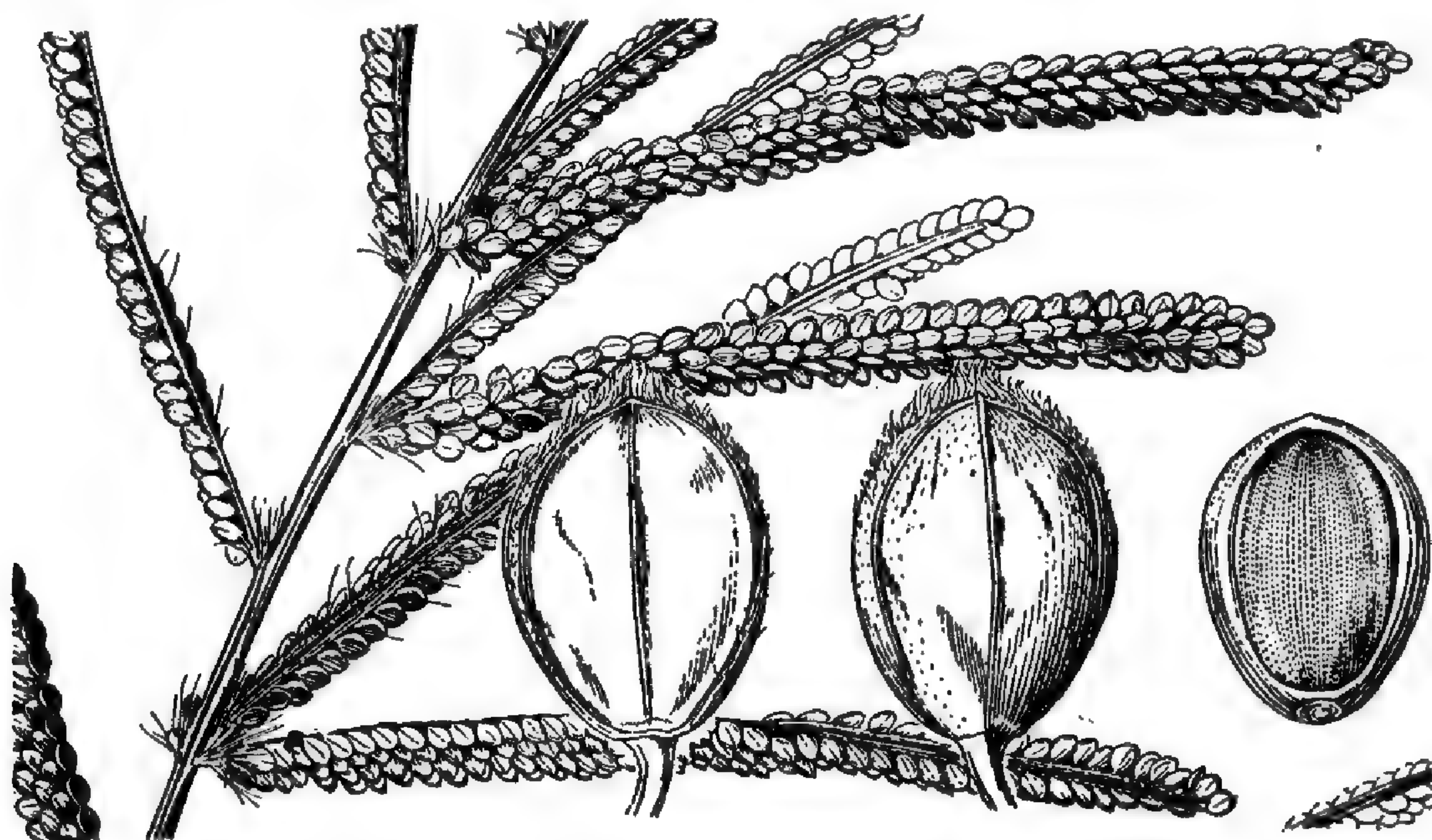


FIGURE 119.—*P. virgatum*. From Hitchcock 9555

Most of the specimens from the West Indies have spikelets about 2.5 mm. long, obscurely puberulent or glabrous except around the margin; the greater number of those from continental North America have spikelets 2.5 to 3 mm. long, commonly puberulent to finely pubescent. The British Guiana specimens are mostly of the West Indian form, but those of the rest of South America are more like the form of continental North America. The material as a whole does not fall into two distinct forms, many smaller spikelets being puberulent and larger ones being nearly glabrous, but the greater number of specimens show the tendencies indicated.

Oliva's no. 68, from Mexico, *Pittier* 12386, from Costa Rica, and *Chase* 7718, from Brazil, have blades puberulent on the upper surface.

Called "talquezal" in El Salvador and "caguazo" in Cuba, and "cortedero," in common with its allies, in other Spanish American countries. The name *Paspalum virgatum* has been incorrectly applied to *P. urvillei*, cultivated for forage (see p. 4).

DISTRIBUTION

Open, mostly moist or swampy ground, southern Texas and Mexico, and the West Indies to Brazil, at rather low altitudes.

TEXAS: Brownsville, *Hitchcock* 5414.

JALISCO: Guadalajara, *Hitchcock* 7363.

VERA CRUZ: Córdoba, *Finck* 7; *Fisher* 54; *Hitchcock* 6413, 6434. Santa Rosa, *Fisher* 63.

OAXACA: Oaxaca, *Hitchcock* 6188.

CHIAPAS: Ocuilapa, *Nelson* 3035.

MEXICO (Republic of): Huentitan, *Oliva* 68.

GUATEMALA: Secanquím, *Pittier* 250. Cristina, *Blake* 7625. Quiriguá, *Standley* 23841, 24131. Puerto Barrios, *Standley* 24719. La Aurora, *Morales* 719. Escuintla, *Hitchcock* 9000. Atescatempa, *Heyde & Lux* (*Dist. Smith*) 6402. Estanzuela, *Heyde & Lux* (*Dist. Smith*) 3898.

EL SALVADOR: San Salvador, *Calderón* 869, 1154. Sonsonate, *Calderón* 1690.

NICARAGUA: Masaya, *Hitchcock* 8639.

COSTA RICA: Guanacaste, *Pittier* 2690. Puntarenas, *Hitchcock* 8579. San José, *Hitchcock* 8467. Alajuelita, *Pittier* 2996. Talamanca, *Tonduz* 8691. Cocos Island, *Pittier* 12386.

PANAMA: Canal Zone, *Celestine* 20; *Hitchcock* 7903; *Killip* 4109, 4356; *Piper* 5199, 5203; *Pittier* 2079, 3724, 6768; *Popenoe* 13; *Standley* 26338, 28456, 31784. Panamá, *Standley* 26882. Taboga Island, *Hitchcock* 8082; *Pittier* 3604 (depauperate). Chepo, *Pittier* 4647, 4693.

CUBA: Santiago de los Baños, *Léon & Hioram* 4366, 4367; *Palmer & Riley* 628. El Guama, *Palmer & Riley* 97. Herradura, *Hitchcock* 468; *Tracy* 9127. Habana, *Tracy* 9120, 9122, 9123, 9124. Marianao, *Léon* 1995. Guanabacoa, *Léon* 2639. Santiago de las Vegas, *Baker & Wilson* 595. Cano, *Léon* 1990. Guines, *Léon* 578. Florida, *Léon* 3962 (abnormal). Santayana, *Ekman* 15335. Isle of Pines, *Britton & Wilson* 14456; *Curtiss* 501; *Palmer & Riley* 1057; *Taylor* 42. Without locality, *Wright* 3446 in part.

JAMAICA: Troy, *Harris* 12602; *Hitchcock* 9791; *Maxon* 2980. Ipswich, *Hitchcock* 9603. Bull Head Mountain, *Hitchcock* 9529, 9555. Between Ewarton and Linstead, *Amer. Gr. Nat. Herb.* 576. Between Ewarton and Moneague, *Hitchcock* 9445. Appleton, *Hitchcock* 9655. Annotta Bay, *Harris* 12660a. Half Way Tree, *Harris* 12897. Castleton Gardens, *Hitchcock* 9400, 9405. Gordon Town, *Hart* 729. Between Bog Walk and Spanish Town, *Hitchcock* 9290. Newcastle, *Hitchcock* 9347. Port Antonio, *Fredholm* 3299.

HAITI: Pilate, *Leonard* 9672. Plaisance, *Leonard* 9174, 9223, 9408. Dondon, *Leonard* 8650. Port-au-Prince, *Ekman* H 2172; *Leonard* 10080. Morne Titon, *Christ* 2185.

DOMINICAN REPUBLIC: Haina, *Faris* 407. Sánchez, *Abbott* 71. Without locality, *Wright Parry & Brummel* 620.

PORTO RICO: Aguada, *Chase* 6599. Mayaguez, *Chase* 6173, 6257. Utuado, *Underwood & Griggs* 794. Vega Baja, *Chase* 6792. Catano, *Chase* 6642; *Heller* 1373. Rio Piedras, *Cowgill* 695; *Heller* 625. Cayey, *Chase* 6740. Mamayes, *Chase* 6649; *Eggers* 1176. Rio Grande, *Chase* 6705, 6706. Luquillo Mountains, *Wilson* 227. Loma Icaco, *Shafer* 3394. Island of Vieques, *Chase* 6703.

VIRGIN ISLANDS: St. Jan, *Hornbeck* (Copenhagen Herb.).

LEEWARD ISLANDS: Antigua, *Hitchcock* 16372. Guadeloupe, *Hitchcock* 16401. Dominica, *Hitchcock* 16439; *Jones* 19.

WINDWARD ISLANDS: Hahn 1060; *Hitchcock* 16447. Barbados, *Dash* 455. St. Lucia, *Brooks* 29; *Hitchcock* 16477; *Kemp* 2. Grenada, *Broadway* 144 and in 1905.

TRINIDAD: Port of Spain, *Hitchcock* 9997. St. Joseph, *Hitchcock* 10030. Aripo Savanna, *Hitchcock* 10073. Point à Pierre, *Broadway* 4947. San Fernando, *Hitchcock* 10118. Oropuche Lagoon, *Britton, Hazen & Freeman* 1150. Siparia, *Broadway* 4987. Cedros, *Broadway* 4939. Matura, *Broadway* 2369. Without locality, *Sieber* 11.

- TOBAGO: Scarboro, *Hitchcock* 10201. Botanic Station, *Broadway* 4390. Rockley Vale, *Broadway* 4058. Frenchfield, *Eggers* 5553.
- COLOMBIA: Santa Marta, *Smith* 125, 126. Buenaventura, *Hitchcock* 19913. Frasquillo, *Pennell* 4590. Puerto Wilches, *Killip & Smith* 14780. Puerto Berrio, *Pennell* 3747. Bogotá, *Uribe*. Neiva, *Rusby & Pennell* 1121. Santa Rosa, *Killip* 11568. Córdoba, *Killip* 5051.
- BRITISH GUIANA: Georgetown, *Hitchcock* 16552. Lamaha Dam, *Jenman* 3660. Coast regions, *Jenman* 4437, 6199. Rockstone, *Gleason* 649. Tumatumari, *Gleason* 34; *Hitchcock* 17336.
- DUTCH GUIANA: Paramaribo, *Kuyper* in 1913. "Surinam," *Weigelt*.
- BRAZIL: Marajó Island, *Goeldi* 184, 191, 199. Rio Branco, *Kuhlmann* 3352. Falls of Madeira, *Rusby* 213. Pernambuco, *Chase* 7718; *Pickel* 1397. Bahia, *Blanchet*. Anna Florencia, *Chase* 9488. Salto d'Itiquira, *Glaziov* 22607. Goyaz, *Gardner* 3504.
- ECUADOR: Tena, *Williams* in 1924.
- PERU: Colonia Perené, *Hitchcock* 22073, 22102. Santa Ana, *Cook & Gilbert* 1531.
- BOLIVIA: Hacienda Anacuri, *Holway* 703. Reyes, *Cárdenas (Mulford Biol. Expl.)* 1656. San Carlos, *Buchtien* 52 in 1927.

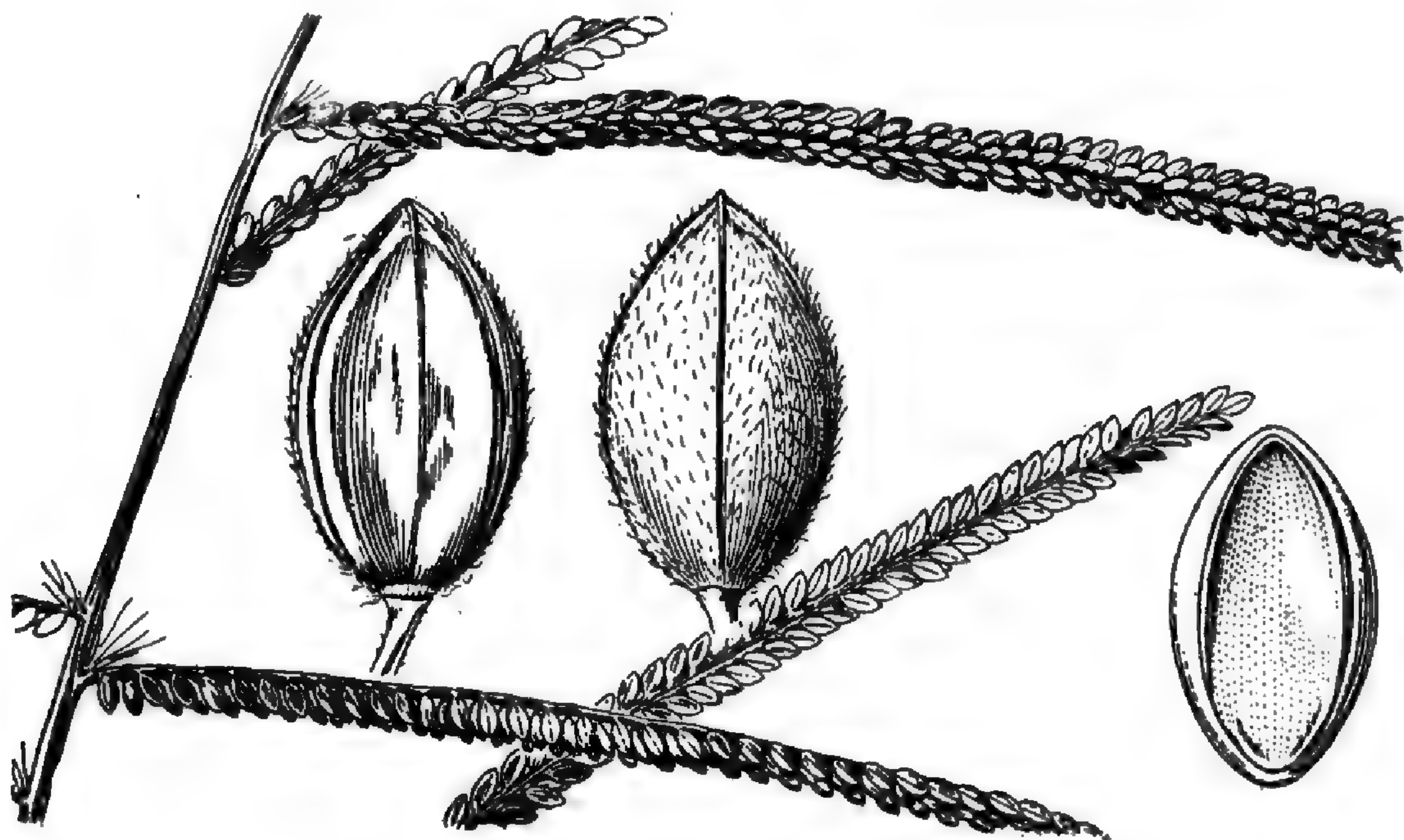


FIGURE 120.—*P. conspersum*. From type specimen and *Chase* 8513

118. *Paspalum conspersum* Schrad.

Paspalum conspersum Schrad.; Schult. Mant. 2: 174. 1817. "In Brasilia. Princeps Sereniss. Maximil. Neowidensis." A specimen so named in Schrader's script, collected by Prince Maximilian, in the Nees Herbarium, now in the Berlin Herbarium, is doubtless the type or part of the type collection. This is a robust plant without the base, the lower sheaths papillose, the uppermost glabrous, the panicle with 8 racemes.

DESCRIPTION

A robust perennial resembling *P. virgatum* in habit; sheaths papillose-pilose to glabrous, the upper commonly glabrous or nearly so, the lower pilose, not at all spongy or reticulate; blades rather more rounded at base than in *P. virgatum*, sometimes subcordate, often finely papillose-pubescent on the upper surface; panicle erect to slightly nodding, 15 to 25 cm. long, of 6 to 16 ascending to spreading or drooping racemes, 7 to 15 cm. long; rachis brownish purple, 0.7 to

1.2 mm. wide, the margin scaberulous but with no long hairs as commonly found in *P. virgatum*; spikelets 2.7 to 3 mm. long, 1.6 to 1.8 mm. wide, elliptic, slightly concavo-convex, deep purple to rusty brown; glume and sterile lemma equal, thin in texture, not loose, 5-nerved, both or the glume only pubescent with soft hairs; fruit 2.5 to 2.7 mm. long, chestnut-brown at maturity, papillose-striate, the palea somewhat concave.

This relatively rare species resembles *P. virgatum* and has been confused with it. It is distinguished by the more slender racemes of elliptic less turgid spikelets, the rachis without the long stiff hairs commonly found in *P. virgatum*.

DISTRIBUTION

Open, moist ground and along streams, up to 1,800 meters altitude, Mexico to Argentina.

JALISCO: San Nicolás, *Hitchcock* 7229.

MORELOS: Yautepec, *Rose, Painter & Rose* 8555.

BRAZIL: Serra da Gramma, *Chase* 9610. Anna Florencia, *Chase* 9487. Antonio Justiniano, *Chase* 8894. Ouro Preto, *Chase* 9339. Lavras, *Chase* 8770. Between Lavras and Formiga, *Dorsett* 211b. Between Urubú and Cambuhy, *Dorsett* 166b. Juiz de Fôra, *Chase* 8504, 8513. Jacarepaguá, *Chase* 8410. Ypiranga, *Holway* 1628. Itararé, *Dusén* 16429.

BOLIVIA: Coripata, *Hitchcock* 22696.

ARGENTINA: Alto Paraná, *Parodi* 5534. Posadas, *Ekman* 588. Formosa, *Venturi (Herb. Parodi)* 3467.

119. *Paspalum acutum* Chase

Paspalum acutum Chase, Journ. Washington Acad. Sci. 17: 146. f. 4. 1927. "Type in the U. S. National Herbarium, no. 1037443, collected in dry fields, Ancon, Canal Zone, September 18, 1917, by E. P. Killip (no. 4003)." The two specimens of this collection lack the base.

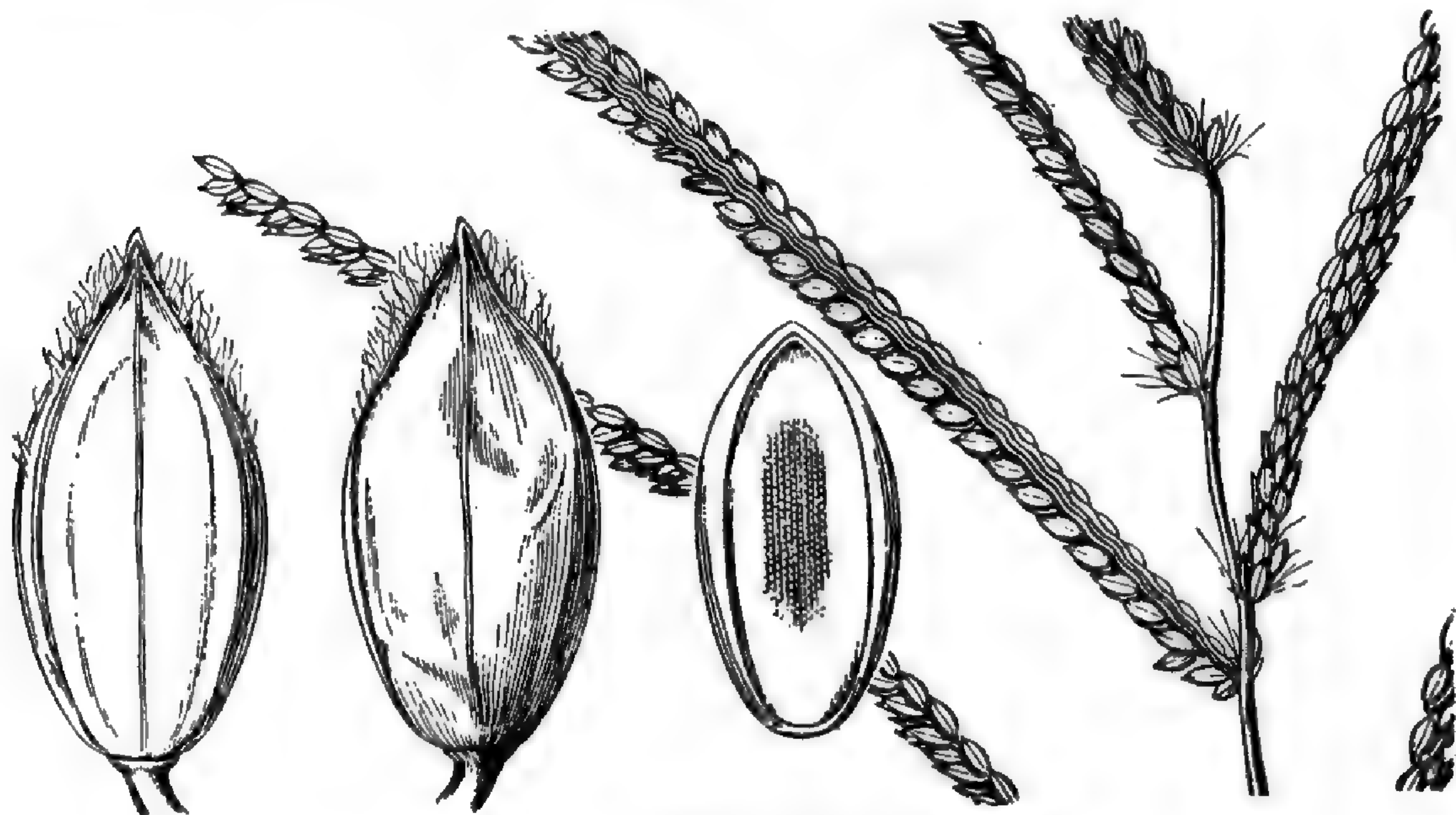


FIGURE 121.—*P. acutum*. From type specimen

DESCRIPTION

A robust perennial, 1 to 2 meters tall; culms simple, glabrous, leafy to the summit; sheaths overlapping, compressed, striate, pilose on the margin at the summit, otherwise glabrous, the junction with the blade slightly constricted,

dark colored; ligule 1.5 to 2 mm. long; blades about as wide as the sheath, slightly rounded and folded at base, flat above, 30 to 75 cm. long, 14 to 18 mm. wide, long-acuminate, glabrous beneath, sparsely pubescent on the upper surface and with long hairs back of the ligule, the margins sharply serrulate, the uppermost blade greatly reduced; panicle scarcely exerted (in specimens seen), the main axis rather slender, 5 to 15 cm. long, plano-convex, scabrous on the margins; racemes 6 to 10, thick, heavy, nodding, 8 to 12 cm. long, with a tuft of long hairs at the base; rachis 1 to 1.5 mm. wide, slightly flexuous, scabrous-serrulate on the margin, otherwise glabrous; spikelets in pairs on minute slender pedicels, imbricate, olive-green, or drying brown, elliptic, 3.5 to 3.9 mm. long, 2 mm. wide, abruptly acute; glume and sterile lemma equal, abruptly pointed beyond the fruit, 5-nerved, the lateral nerves close together near the margins, the glume silky-ciliate on the margin at least toward the summit, or nearly glabrous (spikelets varying in a single raceme), otherwise glabrous or obscurely pubescent, the lemma glabrous; fruit elliptic, 3 mm. long, 1.8 mm. wide, pale-stramineous, the lemma and palea minutely papillose-striate under a lens.

Paspalum acutum differs from *P. virgatum* L. in the more leafy culms and in the longer, pointed, elliptic spikelets, glabrous except the margin of the glume toward the summit, and in the pale fruit.

DISTRIBUTION

Low open ground, and along ditches, Panama to northern Brazil.

PANAMA: Canal Zone, Killip 4003.

BRAZIL: Pará, Goeldi 48, 129.

120. *Paspalum plenum* Chase, sp. nov.

DESCRIPTION

A robust leafy perennial in large clumps; culms simple, erect, 0.9 to 2.5 meters tall, subcompressed, glabrous; nodes glabrous, rarely exposed; sheaths elongate, overlapping, slightly keeled, the lower spongy and succulent, conspicuously reticulate in drying, glabrous or the margin ciliate and occasionally

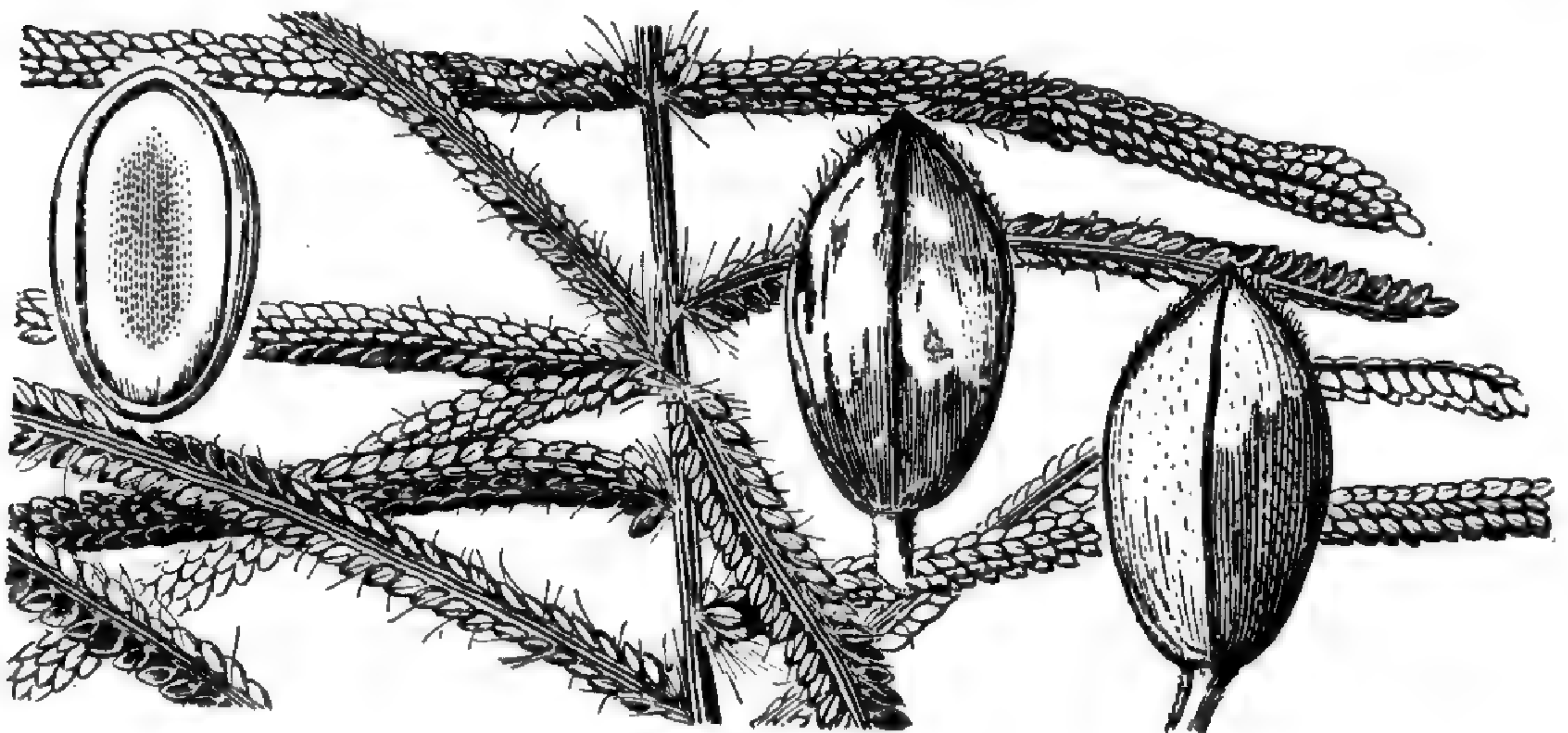


FIGURE 122.—*P. plenum*. From type specimen

hirsute at the sides on the junction with the blade; ligule rather firm, 2 to 3 mm. long, with a dense row of long stiff tawny hairs back of it; blades ascending, folded and with a thick midnerve at the base and narrowed to the width of the sheath, flat and 1.5 to 2.5 cm. wide above, 40 to 90 cm. long, attenuate to the tip (the uppermost narrow and involute), glabrous except for the dense tuft of

hairs back of the ligule, the margin and the midnerve on the under surface toward the tip sharply serrulate; panicle nodding, the numerous racemes drooping from the rather stiff axis, 18 to 40 cm. long, of 25 to 90, commonly 40 to 80, racemes, the lower 8 to 18 cm., commonly 12 to 15 cm., long, gradually shorter upward, the uppermost 2 to 3 cm., the common axis sharply angled, or toward the base subterete, scabrous on the angles toward the summit; rachis mostly purplish, 1.2 to 1.5 mm. wide, with copious long stiff hairs at the base, the margins sparsely to conspicuously ciliate with stiff hairs 5 to 8 mm. long; spikelets in pairs on angled pedicels, crowded (or rather distant at base of the lower racemes), 2.5 to 3 mm. long, 1.3 to 1.5 mm. wide, obovate-elliptic, subacute; glume and sterile lemma equal, thin in texture, 3-nerved, the glume sparsely pubescent with soft hairs along the margin toward the summit, otherwise very minutely pubescent to glabrous, the lemma glabrous, or very obscurely pubescent, both blotched with reddish purple or in age all dull brown; fruit 2.4 to 2.5 mm. long, stramineous, papillose-striate.

Type in the U. S. National Herbarium, no. 951959, collected "along a railway cut through jungle," near Jalapa, Vera Cruz, Mexico, at 1,400 meters altitude, September 3, 1910, by A. S. Hitchcock (no. 6643).

As shown by Botteri's no. 1266, Bourgeau's 2380, Galeotti's 5714, and Schaffner's 107, in the Paris Herbarium, all named "*Paspalum lentiginosum* Presl" in Fournier's script, this is the species so called in his work.⁵² Bourgeau's 2975 in the Paris Herbarium, named *P. lentiginosum* by Fournier is *P. affine*, but this number in the United States National Herbarium is *P. plenum*.

Paspalum plenum is related to *P. intermedium* Munro of South America, from which it differs in having broader spikelets, pubescent at the summit of the sterile lemma, and larger, less congested panicles of longer laxer racemes.

DISTRIBUTION

Wet open or brushy ground or in shallow water, up to 1,400 meters, southern Mexico to Costa Rica; also in Colombia.

NAYARIT (TEPIC): Yxtlan del Río, *Mexia* 829.

VERA CRUZ: Jalapa, *Hitchcock* 6643. Between Coaltepec and Jalapa, *Hitchcock* 6684. Orizaba, *Botteri* 1267 and in 1856; *Bourgeau* 2975. Monte Pacho, *Liebmann* 173. Zacuapan, *Purpus* 2906.

GUATEMALA: Cobán, *Johnson* 439; *Türckheim* 459, 3791.

COSTA RICA: Nuestro Amo, *Jiménez* 520, 533. Aguacaliente, *Pittier* 2409.

COLOMBIA: Medellín, *Toro* 569. Fredonia, *Toro* 152. Dept. Cundimarca, *Ariste Joseph* 1066.

121. *Paspalum nelsoni* Chase, sp. nov.

DESCRIPTION

An erect leafy, somewhat glaucous perennial; culms 1.9 cm. tall, subcompressed, glabrous; nodes constricted, glabrous; sheaths keeled, mostly overlapping, loose toward the summit, coarsely papillose-hirsute and with a dense tuft of stiff tawny hairs 5 to 7 mm. long on either side at the summit, the uppermost sheath glabrous, its blade reduced to a slender point; ligule firm, erose, about 3 mm. long; blades ascending, flat, or drying subinvolute, 30 to 42 cm. long, 1.2 to 1.5 cm. wide, tapering to a base scarcely as wide as the sheath, the upper surface papillose-hirsute toward the base, densely so back of the ligule, the hairs as much as 1 cm. long, and appressed hirsute toward the tip, the lower surface

⁵² Mex. Pl. 2: 9. 1886.

glabrous, the margin sharply serrulate; panicle nodding, 25 cm. long, of 18 relatively slender curving racemes, the lower 12 cm. long, the upper gradually shorter, the common axis slender, angled, purplish; rachis deep purple, about 1 mm. wide, the margin serrulate and irregularly ciliate with pale stiff hairs 5 to 7 mm. long, and with copious long hairs at the base; spikelets in pairs on slender pedicels, rather loosely crowded, 2.1 to 2.3 mm. long, about 1.3 mm. wide, obovate-elliptic, abruptly subacute; glume and sterile lemma equal, thin in texture, 3-nerved, pale to brownish, the glume silky pubescent, the hairs short and sparse except near the margin, there dense and toward the summit elongate, the sterile lemma with a few obscure hairs near the summit only, both

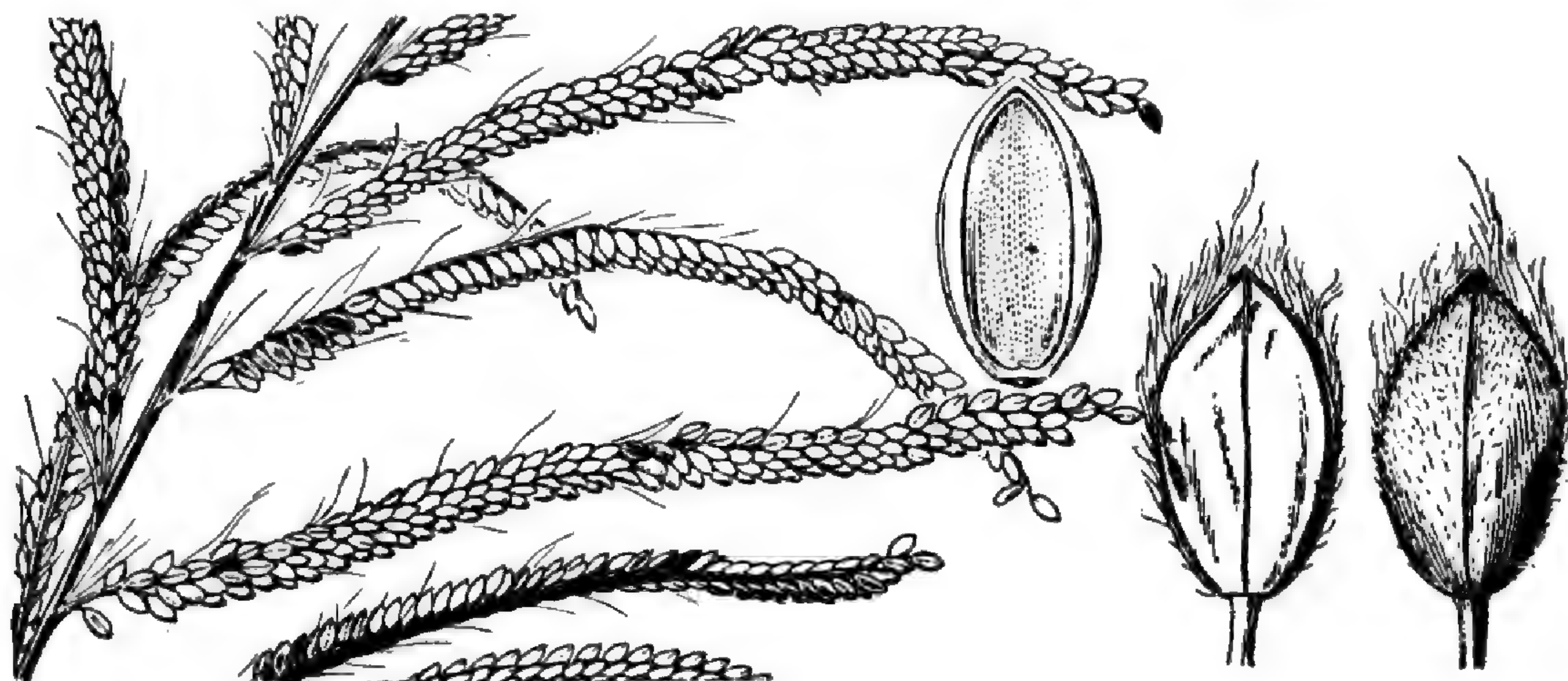


FIGURE 123.—*P. nelsoni*. From type specimen

finely speckled with brown or blotched with purple; fruit about 2 mm. long, pale, finely papillose-striate.

Type in the U. S. National Herbarium, no. 233485, collected on table-land, Ocuilapa, Chiapas, Mexico, at 1,000 to 1,200 meters altitude, August 21, 1895, by E. W. Nelson (no. 3047).

This species, known only from the type collection, was referred to *P. conspersum* Schrad. in the Grasses of Mexico.⁵³ It differs from that species in its glaucous color, the narrower blades tapering to the base, the coarser pubescence of the sheaths, the more slender racemes with long-ciliate rachises, and in the spikelets with long hairs at the summit. The species is named for the collector, Dr. E. W. Nelson, the zoologist, who in his field work in little known regions took the trouble to collect plants, contributing much valuable material to the United States National Herbarium.

122. *Paspalum secans* Hitchc. & Chase

Paspalum secans Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 319. 1917. "Type in the U. S. National Herbarium, no. 732740, collected on Monte Mesa, Porto Rico, October 17, 1913, by Agnes Chase (no. 6174)." This specimen is 1.35 meters tall, and has 9 racemes.

DESCRIPTION

A nearly erect perennial, glabrous as a whole, in large clumps with numerous long-leaved sterile shoots, commonly rather pale throughout; culms simple or rarely with a flowering branch, 75 cm. to nearly 2 meters tall; sheaths mostly

⁵³ Contr. U. S. Nat. Herb. 17: 239. 1913.

overlapping, commonly separating from the culm and becoming involute above, stiffly ciliate toward the summit, the lower rather loose and papery; ligule about 1.5 mm. long, with a dense row of long stiff hairs back of it; blades ascending or spreading from an erect base, firm, V-shaped in cross section but drying more or less involute, 20 to 100 cm. long, 5 to 10 mm. wide, tapering to a base narrower than the sheath, long-acuminate, stiffly ciliate toward the base, the margin very sharply serrulate; panicle of 3 to 19, commonly 7 to 12, slender spreading or arching racemes, on a slender angled axis 5 to 15 cm. long, the racemes 6 to 15, rarely to 18 cm. long; rachis about 0.7 mm. wide, sharply scabrous on the margin, short-pubescent at the very base and usually with a few long hairs; spikelets in pairs on minute scabrous pedicels, scarcely crowded, 2.3 to 2.7 mm. long, 1.5 to 1.6 mm. wide, obovate-elliptic, often minutely apiculate, pale to leaden-purplish, glabrous; glume and sterile lemma equal, rather firm, 3-nerved; fruit 2.3 to 2.4 mm. long, pale, minutely papillose-striate.

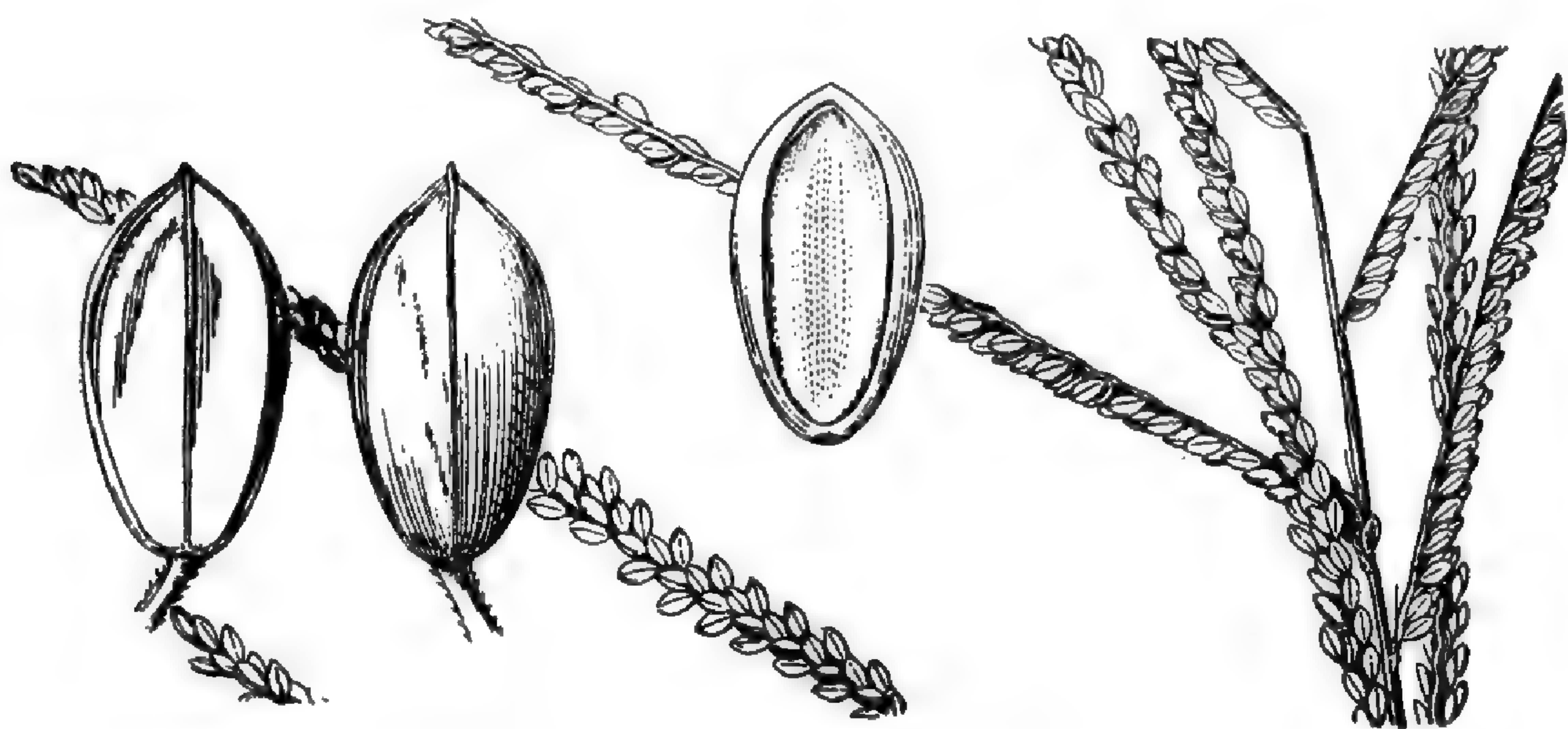


FIGURE 124.—*P. secans*. From type specimen

DISTRIBUTION

Open or brushy slopes and savannas, usually in drier situations than occupied by others of the *Virgata* group, at low altitudes, in the West Indies.

- BAHAMAS: New Providence, *Britton & Brace* 598. Inagua, *Nash & Taylor* 956.
 CUBA: Santiago de los Baños, *Léon & Hioram* 4366½. Habana, *Léon* 931b, 932. Cano, *Ekman* 184. Tunas, *Léon* 6743. Cauasí, *Léon & Roig* 12961. Baraguá, *Hitchcock* 23343. Isle of Pines, *Ekman* 12223.
 JAMAICA: Montego Bay, *Hitchcock* 9670. Black River, *Hitchcock* 9649.
 HAITI: Gourjon, *Ekman* H 6451. Between Les Anglais and Chardonniér, *Ekman* H 384.
 PORTO RICO: Mayaguez, *Amer. Gr. Nat. Herb.* 577; *Chase* 6150, 6174, 6309; *Holm* 84. Maricao, *Chase* 6193, 6238. Arecibo, *Chase* 6444, 6559. Lares, *Chase* 6581. Between Utuado and Adjuntas, *Chase* 6465. Campo Alegre, *Chase* 6787. Between Ponce and Santa Isabel, *Britton & Brown* 5518. Bayamon, *Chase* 6382, 6387, 6409. Catano, *Chase* 6641. Rio Piedras, *Chase* 6372; *Wetmore* 167. Trujillo Alto, *Sein* 321. Caguas, *Britton & Cowell* 1405; *Sintenis* 2539. Rio Grande, *Chase* 6707, 6716, 6723. Loma Icaco, *Shafer* 3415. Island of Vieques, *Chase* 6698.
 VIRGIN ISLANDS: St. Thomas, *Foster*. St. Croix, *Hitchcock* 16323; *Ricksecker* 434
 LEEWARD ISLANDS: Antigua, *Wullschlaegel* 603. Guadeloupe, *Hitchcock* 16408.
 CURAÇAO: *Boldingh* 4836.

123. *Paspalum arundinaceum* Poir.

Paspalum arundinaceum Poir. in Lam. Encycl. Suppl. 4: 310. 1816. "Cette plante croît à la Caroline, où elle a été recueillie par M. Martin. (V. s. in herb. Desf.)." The type, in the Desfontaine Harbarium in Florence, is labeled "Martin, Cayenne," the locality published being erroneous. According to Lasegue,⁵⁴ Martin, from the Jardin des Plantes, Paris, was stationed at Cayenne as director of colonial gardens and nurseries of French Guiana. He was never in North America. The specimen agrees with Poirét's description. In a very few spikelets of this specimen the first glume is developed.

Paspalum elatum Rich.; Doell in Mart. Fl. Bras. 2²: 78. 1877. "(In herbarii sui, nunc Francavillani, schedula.) * * * In Guiana gallica a cl. Leprieur annis 1834 et 1847, nec non anno 1859 prope Cayenne a cl. Sagot, denique a cl. Yelsky lectum." A specimen from the Richard Herbarium Guayanensi-Antillarum, with the name and diagnosis in Richard's script and with his drawings of the spikelet, is now in the Paris Herbarium. It consists of an immature panicle and a leafy shoot. There is a second complete specimen labeled "Cayenne," and a third labeled "Guyane française, Le Prieur," both named in Richard's script. In the Brussels Herbarium is a fragmentary specimen labeled in Doell's script "Guiana gall. Leprieur in herb. sui schedula L. C. Richard." Another Leprieur specimen in the Drake Herbarium in Paris bears the name in Doell's script. These all appear to be from the same collection. In a very few spikelets the first glume is developed. In Sagot 1344, examined in Vienna and at Kew, and in Jelski's specimen from Cayenne in 1867, in the Vienna Herbarium, the first glume is more frequently developed, as described by Doell.

This is the form which Grisebach confused with *P. virgatum* under the name *P. virgatum* var. *stramineum* (see page 197) and to which Hitchcock⁵⁵ applied the name *P. virgatum schreberianum* Flügge, and Nash⁵⁶ that of *P. schreberianum* (Flügge) Nash. The identity of Flügge's variety, which was described from South America, is uncertain. Flügge's types have not been located. The description of the panicle as having about 30 racemes, the margin of the rachis subpilose, strongly suggests *P. millegrana*, which is common in South America. No specimen of *P. arundinaceum* has been seen with more than 22 racemes, nor with pilose rachis.

In the Grasses of the West Indies⁵⁷ the specimens from Cuba and Jamaica were doubtfully referred to *P. secans*. A much larger amount of material now shows the two to be distinct, though closely related.

DESCRIPTION

An erect robust glabrous perennial in large clumps; culms simple, 1.2 to 2 meters tall; sheaths elongate, overlapping, commonly separating from the culm and becoming involute above, inconspicuously ciliate at the summit or glabrous, the lower slightly or not at all reticulate in drying; ligule 2 to 3 mm. long, with a ring of stiff hairs 3 to 5 mm. long back of it; blades ascending from an erect narrow folded or involute base, firm, V-shaped in cross section, often drying conduplicate or involute, commonly 0.5 to 1 meter or more long, 5 to 10 mm. wide, with a long attenuate scabrous tip, the margin very sharply serrulate; panicle of 9 to 25, commonly 12 to 18, rather thick ascending racemes, 8 to 20 cm. long, approximate or fascicled on a sharply angled axis, 10 to 20 cm. long; rachis

⁵⁴ Musée Bot. Delessert 191. 1845.

⁵⁵ Contr. U. S. Nat. Herb. 12: 206. 1909.

⁵⁶ N. Amer. Fl. 17: 190. 1912.

⁵⁷ Contr. U. S. Nat. Herb. 18: 319. 1917.

about 1 mm. wide, sharply scabrous on the margin and with a few long hairs at the very base; spikelets in pairs on minute scabrous pedicels, crowded, or loosely arranged toward the base, 2.5 to 2.7 mm. long, about 1.8 mm. wide, obovate-elliptic, commonly leaden-purplish, glabrous; glume and sterile lemma equal, rather firm, somewhat loose, 3-nerved; fruit 2.5 mm. long, pale, minutely papillose-striate.

In most of the specimens from the Guianas a narrow first glume is developed on an occasional spikelet. This glume has been observed in only two specimens from the West Indies, *Hitchcock* 9644 and 16375. It is developed in the one specimen known from continental North America, *Standley* 25130.

DISTRIBUTION

In marshes and low open ground, occasionally in springy places on slopes; West Indies, east coast of Guatemala, and French Guiana.

GUATEMALA: Puerto Barrios, *Standley* 25130.

CUBA: Pinar del Río, *Hitchcock* 23293. Herradura, *Hitchcock* 478. Guanajay, *Palmer & Riley* 813.

Habana, *Tracy* 9125, 9126. Cano, *Ekman* 184. Batabanó, *Baker & Wilson* 2303; *Hitchcock* 477. Hanábana, *Wright* 3446 in part. Cayamas, *Baker* 3626.

JAMAICA: Black River, *Harris* 12544; *Hitchcock* 9644. Bull Head Mountain, *Hitchcock* 9536. Between Ewarton and Linstead, *Hitchcock* 9457. Annotta Bay, *Harris* 12469a.

HAITI: Plaisance, *Cook, Scofield & Doyle* 174. Trouin, *Ekman* H 2435. Gourjon, *Ekman* H 6452. Fond Parisien, *Leonard* 4174, 4187. Ennery, *Leonard* 9079.

LEEWARD ISLANDS: Antigua, *Hitchcock* 16375.

FRENCH GUIANA: Cayenne, *Broadway* 58; *Leprieur*.

124. *Paspalum millegrana* Schrad.

?*Paspalus virgatus* β *schreberianus* Flüge, Monogr. Pasp. 190. 1810. "America meridionalis Schreber * * * Exempla dono dederunt Schreberus." Flüge's types have not been located. (See page 1.) The brief description "spicis circiter triginta; rachi margine subpilosa; glumis undique glabris" strongly suggests *P. millegrana*, which is the commonest of the allied species with glabrous spikelets. Doell⁵⁸ refers Flüge's varieties *schreberianus* and *jacquinianus* to his *P. virgatum* δ *glabriusculum*, but the only specimen cited for this variety, "R. Spruce *Paspalum* N. 16," is named by him in the Munich and in the DeCandolle herbaria *Paspalum virgatum* var. *platyaxon* Doell, for which he cites no specimen. Spruce's *Paspalum* 16 agrees with the description of *P. virgatum* var. *platyaxon*, and is taken for the type of that, and the basis of *Paspalum platyaxis* Mez, not known from North America.

Paspalum millegrana Schrad. in Schult. Mant. 2: 175. 1824. "In Brasilia. Princeps Sereniss. Maximil. Neowidensis." The type has not been located. The description applies very well to the species, found along the coast from southern Brazil to the Guianas and common throughout the West Indies, to which the name has been applied.⁵⁹

Paspalum vulnerans Salzm.; Steud. Nom. Bot. ed. 2. 2: 273, 1841, as synonym of *P. densum* Poir. The specimen so named by Salzmann in the Institut Botanique

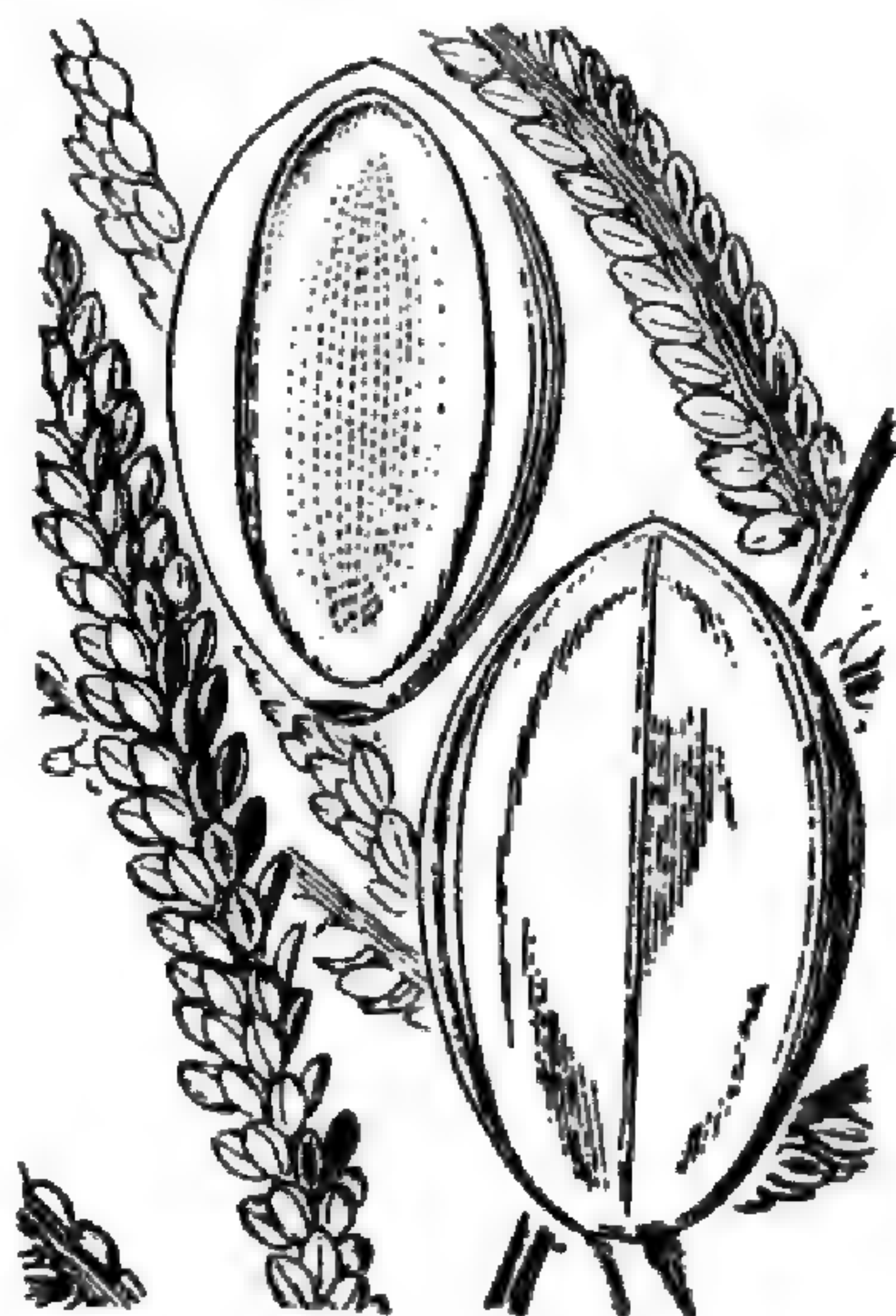


FIGURE 125.—*P. arundinaceum*.
From *Hitchcock* 9457

⁵⁸ Mart. Fl. Bras. 2²: 89. 1877.

⁵⁹ Contr. U. S. Nat. Herb. 12: 203, 1909; 18: 320. 1917.

of Montpellier is a rather small plant. The name doubtless refers to the cutting edges of the blades.

Paspalum karwinskyi Fourn. Mex. Pl. 2: 8. 1886. "Savana grande, inter El Chapopote et Tamalor (KARW. n. 1476)." This name was earlier listed without description by Hemsley.⁶⁰ The type was examined by A. S. Hitchcock at the herbarium of the Botanical Garden, Leningrad. The "*P. lentiginosum* Presl" from which Fournier differentiates it is, as shown by examination of a number of specimens cited, *P. plenum*. The locality cited can not be located.

Paspalum underwoodii Nash, Bull. Torrey Club 30: 375. 1903. "Type collected by Underwood and Griggs along roadsides, Mayaguez to Joyua [Porto Rico] * * * no. 149." "Joyua" is, according to a letter from Dr. E. W. Olive, an error for "La Jagua," a swampy valley back of the experiment station at Mayaguez. The type is in the herbarium of the New York Botanical Garden and a duplicate is in the United States National Herbarium.

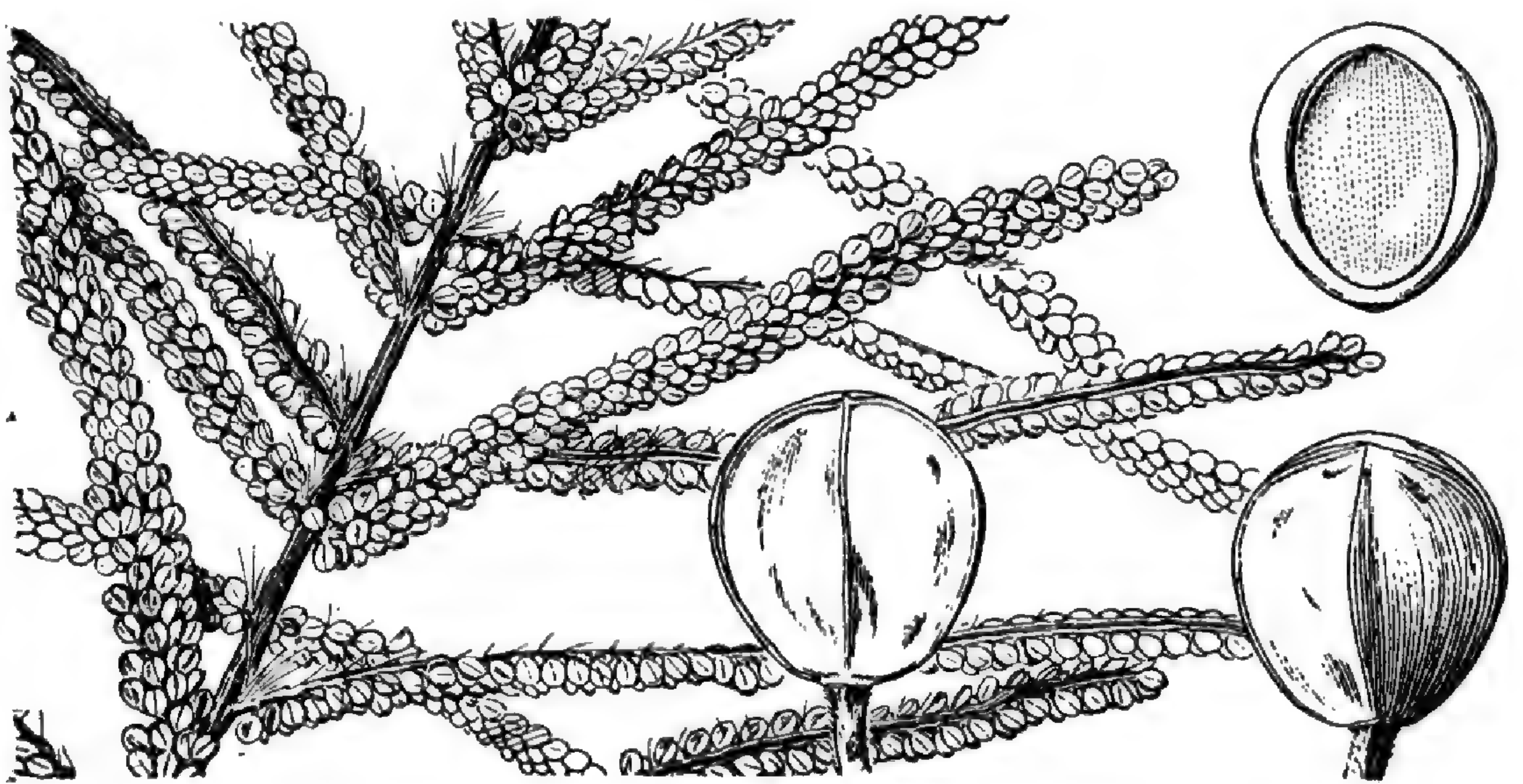


FIGURE 126.—*P. millegrana*. From Chase 7840

?*Paspalum schreberianum* Nash, N. Amer. Fl. 17: 190. 1912. Based on *P. virgatum* var. *schreberianum* Flügge, but misapplied to *P. arundinaceum* Poir.

DESCRIPTION

A robust erect or ascending perennial, glabrous as a whole, in large tough clumps, often purplish toward the base; culms simple (very rarely with a sterile branch), 0.9 to 2 meters tall, compressed; sheaths overlapping, broad and loose, the lower numerous, crowded, spongy and succulent, reticulate in drying, the upper sometimes with a few stiff hairs toward the summit, frequently hirsute on the collar; ligule 1.5 to 2 mm. long; blades ascending or spreading, firm, folded at base, V-shaped in cross section above, commonly 30 to 75 cm. long, sometimes longer, 7 to 15 mm. wide, the base as wide as the summit of the sheath, long-acuminate, densely hirsute back of the ligule, the hairs not long and conspicuous as in *P. secans*, papillose-pubescent to nearly glabrous on the upper surface, the lower surface very scabrous toward the tip, the margins very sharply serrulate; panicle of 6 to 60, commonly 12 to 25, rather thick ascending to spreading racemes approximate on a strongly angled scabrous or sparsely hispid axis 6 to 30 cm. long, the racemes 6 to 16 cm. long; rachis 0.9 to 1.2 mm. wide,

⁶⁰ Biol. Centr. Amer. Bot. 3: 479. 1885.

often irregularly flexuous, sharply serrulate and sparsely stiff-ciliate on the margin, the cilia rarely few or wanting, and with few to copious long stiff hairs in the axils; spikelets in pairs on minute scabrous pedicels, irregularly crowded, 2 to 2.4 mm. long, about 2 mm. wide, obovate-suborbicular, depressed plano-convex, pale to leaden-purplish, glabrous; glume and sterile lemma equal, scarcely covering the fruit at maturity, rather firm, 3-nerved, often slightly inflated at maturity with the midnerve of the glume raised into a keel and the sterile lemma almost obcordate; fruit 2 to 2.1 mm. long, pale, minutely papillose-striate.

DISTRIBUTION

Moist savannas, along ditches, and in low open ground at low altitudes. Honduras and El Salvador and the West Indies to southern Brazil.

HONDURAS: Tela, *Standley* 53591. Stan Creek, *Robertson* in 1890. (British Museum).

EL SALVADOR: Without locality, *Choussy* 37.

BAHAMAS: New Providence, *Krebs* (Copenhagen Herb.).

CUBA: Santiago de Los Baños, *Léon & Hioram* 4364. Pinar del Río, *Hitchcock* 23259. Habana, *Léon* 931, 4157, 4160; *Tracy* 9121. Guanabacoa, *Léon* 2870. Bajucal, *Van Hermann* 347. Cano, *Léon* 1987. Santiago de las Vegas, *Van Hermann* 142. Tunas, *Léon* 6735. San Marcos Savanna, *Léon* 9183. Lagoon Mojabraga, *Léon & Loustalot* 9413. Between Camaguey and Santayana, *Britton* 2361. Baraguá, *Hitchcock* 23366. Sierra de Nipe, *Ekman* 10118. Bayate, *Ekman* 6176. Without locality, *Wright* 3446 in part, 3840.

JAMAICA: Savanna-la-Mar, *Hitchcock* 9869. Troy, *Harris* 12657. Bull Head Mountain, *Hitchcock* 9557. Savoy, *Harris* 11620. Ashley Hall, *Harris* 12730. Annotta Bay, *Harris* 12469, 12534, 12658, 12660. Buff Bay, *Hitchcock* 9776.

HAITI: Aux Cayes, *Ekman* H 256, H 861.

DOMINICAN REPUBLIC: Haina, *Faris* 267.

PORTO RICO: Mayaguez, *Amer. Gr. Nat. Herb.* 578; *Chase* 6153, 6164, 6187, 6257½, 6303; *Goll* 923; *Heller* 4368; *Sintenis* 1223 in part; *Underwood & Griggs* 149. Maricao, *Chase* 6237. Aricebo, *Chase* 6441, 6565. Campo Alegre, *Chase* 6626. Vega Baja, *Britton & Cowell* 1449; *Chase* 6793, 6794. Bayamon, *Chase* 6373, 6646. Catano, *Chase* 6637. San Juan, *Chase* 6356, 6359, 6785. Rio Piedras, *Cowgill* 691; *Wetmore* 176. Trujillo Alto, *Chase* 6761, 6775½. Mameyes, *Chase* 6650. Rio Grande, *Chase* 6725. Fajardo, *Chase* 6704. Playa de Fajardo, *Chase* 6655. Playa de Humacao, *Eggers* 676. Island of Vieques, *Chase* 6687.

LEEWARD ISLANDS: Guadeloupe, *Balbis* in 1822; *Hitchcock* 16411.

TRINIDAD: Cedros, *Broadway* 4921; *Hitchcock* 10145. Icacos, *Hitchcock* 10156. Dabadie, *Broadway*. Manzanilla, *Hitchcock* 10366.

TOBAGO: Scarborough, *Hitchcock* 10285. Milford Road, *Broadway* 3066. Old Grange Road, *Broadway* 4696.

VENEZUELA: Without locality, *Goodwin* in 1919.

BRITISH GUIANA: Morawhanna, *Hitchcock* 17477. New Amsterdam, *Hitchcock* 16819. Georgetown, *Hitchcock* 16781. Rupununi Savanna, *Melville* 161.

DUTCH GUIANA: Paramaribo, *Kuyper* in 1913.

FRENCH GUIANA: Cayenne, *Broadway* 887, 971.

BRAZIL: Marajó Island, *Goeldi* 211, 213. Pará, *Goeldi* 10, 14. Pernambuco, *Chase* 7682. Maceió, *Chase* 7840. Bahia, *Glocker* 600; *Blanchet*; *Salzmann*. Rio de Janeiro, *Chase* 8219, 9810; *Wilkes Expl. Exped.* Ipanema, *Berro* in 1911. Guarujá, *Bailey* 950. Porto Dom Pedro II., *Dusén* 13890. Without locality, *Gardner*; *Glaziou* 476, 4345.

125. *Paspalum densum* Poir.

Paspalum densum Poir. in Lam. Encycl. 5: 32. 1804. "Porto-Ricco * * * Ledru (V. s. in herb. Lam.)" The type, in the Lamarek Herbarium, consists of a mature panicle and a single detached leaf.

Paspalum paniceum Smith in Ree's Cycl. 26: no. 14. 1813. "Gathered in Jamaica by W. Wright, M. D." A specimen of *P. densum* labeled "Jamaica, Dr. Wright * * * Herb. Forsyth," but with no name on the sheet, in the Kew Herbarium, appears to be part of the type collection. It agrees perfectly with the detailed description.

DESCRIPTION

A robust erect perennial, glabrous as a whole, thick and succulent at base, in large clumps; culms simple, 0.8 to 2 meters tall, compressed, the nodes from glabrous to densely appressed-hirsute; sheaths keeled, elongate, broad and loose, greatly overlapping and conspicuously equitant toward the base, flesh-colored to purplish, spongy and succulent, reticulate in drying, ciliate on the margin toward the summit and sometimes appressed-hirsute on the collar, or wholly

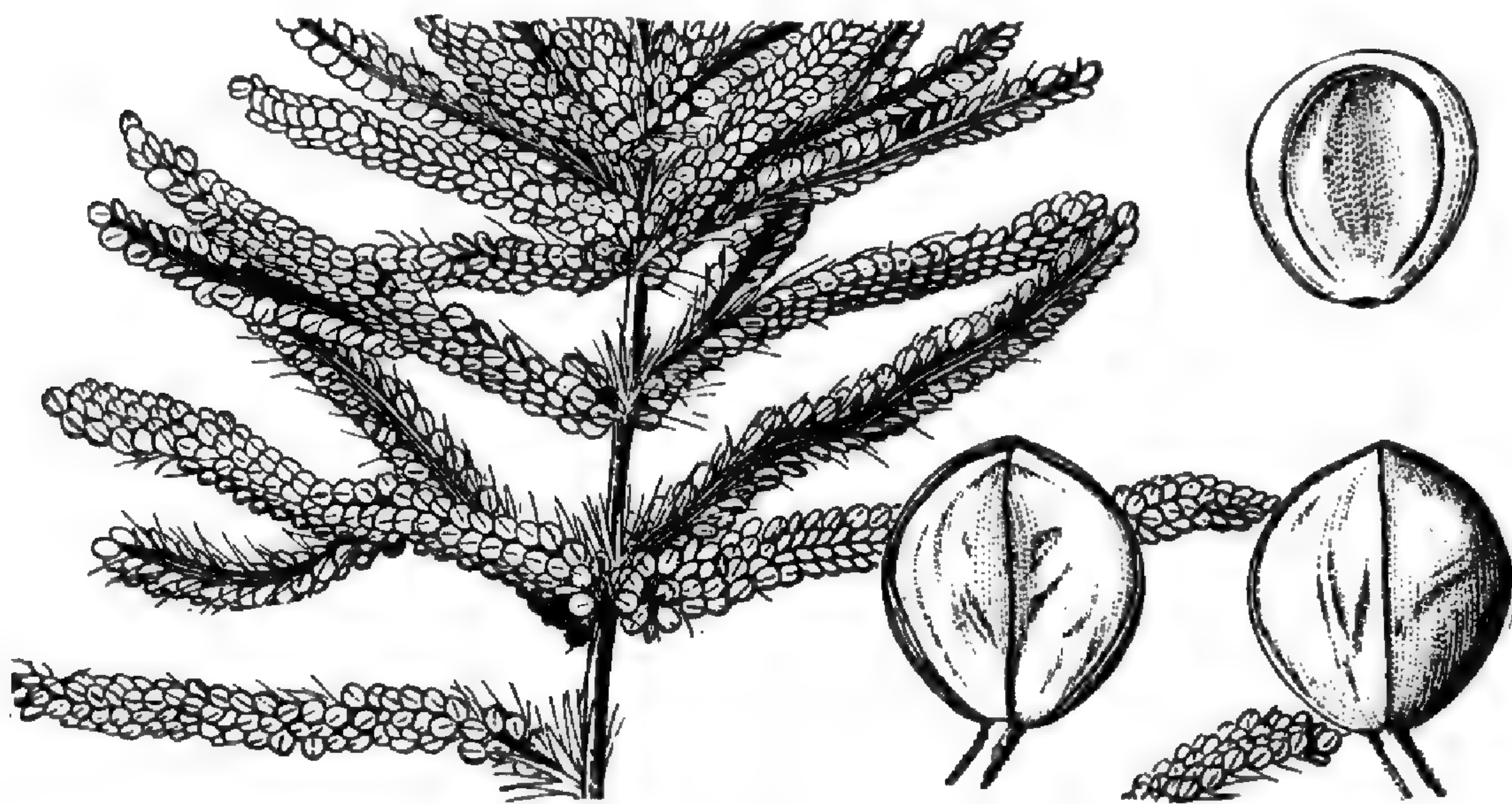


FIGURE 127.—*P. densum*. From type specimen and Chase 6791

glabrous; ligule 1.5 to 3 mm. long; blades ascending, firm, folded at base, V-shaped in cross-section above, commonly 50 to 80 cm., often 1 meter long, 1 to 2 cm. wide, the base equaling the summit of the sheath, the junction rather inconspicuous, long-acuminate, from sparsely to densely long-hirsute back of the ligule (rarely glabrous), the margins very sharply serrulate; panicle 12 to 30 cm., rarely to 40 cm., long, elongate-pyramidal, from tan-colored to purplish, of 50 to 100 or more rather thick racemes, the lower 5 to 9 cm. long, rather distant, finally spreading, the others successively shorter, more crowded and ascending, the tapering tip of the panicle composed of densely crowded very short racemes, the common axis strongly angled, with conspicuous tufts of long hairs in the axils; rachis 1.2 to 1.5 mm. wide, purplish brown, sharply serrulate and conspicuously ciliate with stiff hairs 2 to 5 mm. long; spikelets in pairs on slender scabrous pedicels, irregularly crowded, 1.9 to 2.2 mm. long, about 1.8 mm. wide, suborbicular, commonly somewhat unsymmetrical from pressure, depressed plano-convex, tan-colored to brownish, sometimes purple-tinged; glume and sterile lemma equal, 3-nerved, thin and fragile, under a lens very minutely papillose; fruit about 1.8 mm. long, pale, papillose-striate.

DISTRIBUTION

In marshes, wet savannas, ditches, and low open ground, or in shallow water or springy places on slopes, at low altitudes in the West Indies and Panama to Brazil, ascending the Amazon to eastern Bolivia.

PANAMA: Canal Zone, *Hitchcock* 8020; *Killip* 4106. Sabana de Dormisolo, *Pittier* 4646.

CUBA: Mantua, *Ekman* 11085. Hanábana, *Wright* 3447. Rodrigo, *Léon* 9135. Placetas del Sur, *Léon* 6420. Baraguá, *Hitchcock* 23381.

JAMAICA: Bull Head Mountain, *Amer. Gr. Nat. Herb.* 579. Killits, *Harris* 11149. Appleton, *Hitchcock* 9657. Bog Walk, *Harris* 12214.

HAITI: Marmelade, *Leonard* 8357. Kalacroix, *Leonard* 7989. St. Michel de l'Atalaye, *Ekman* H 9416. Petite-Riviere de l'Artibonite, *Ekman* H 3430.

DOMINICAN REPUBLIC: Pimentel, *Abbott* 671.

PORTO RICO: Vega Baja, *Chase* 6791. Between Bayamon and Catano, *Stahl* 42.

VIRGIN ISLANDS: St. Thomas, *Riedley*.

LEEWARD ISLANDS: Guadeloupe, *Duss* 4224.

TRINIDAD: St. Joseph, *Hitchcock* 10025. St. Augustine, *Hart* 2155. Longdenville, *Broadway* 2618. Claxton Bay, *Hitchcock* 10115.

COLOMBIA: Savanna de San Martin, *Shaw* in 1927.

VENEZUELA: Mene Grande, *Pittier* 10624. Llanos del Alto-Apure, *Jahn* 192.

BRITISH GUIANA: Parika, *Hitchcock* 16816. Lamaha, *Jenman* 3656.

BRAZIL: Marajó Islands, *Goeldi* 86, 212, 264. Pará, *Goeldi* 1. Matto de São João, *Chase* 8140, 8148.

BOLIVIA: Reyes, *White* 1499. Buena Vista, *Steinbach* 6898.

Coryphaea.—Robust rhizomatous perennial, in large clumps, with hirsute sheaths, long flat blades, and large panicles of numerous slender racemes. All the related species are confined to South America.

126. *Paspalum coryphaeum* Trin.

Paspalum coryphaeum Trin. Gram. Pan. 114. 1826. "Brasil. (Langsdorff.)" The type specimen in the Trinius Herbarium, labeled "In humidis prope Ytú, Brasil. Langsdorff," was examined by A. S. Hitchcock. The spikelets are 2.5 mm. long, the glume glandular-pubescent with fine hairs, the sterile lemma glabrous.

Paspalum pruinatum Trin. Gram. Icon. 3: pl. 272. 1836. "Figura ad specimen Brasilianum." In the Trinius Herbarium is a specimen collected by Langsdorff which is the original of plate 272. This is a plant with hirsute sheaths and a rather open panicle, the spikelets 2.2 mm. long, both glume and sterile lemma glandular pubescent. In the "Corrigenda et emendata," for volume 3 Trinius referred *P. pruinatum* to *P. coryphaeum* Trin.

Paspalum familiare Steud. Syn. Pl. Glum. 1: 24. 1854. "Funck coll. nr. 228 * * * Columbia." The type, bearing the name in Steudel's script, is in the Paris Herbarium. It was collected at Caripe. This is in Venezuela, not Colombia. According to Lasègue⁶¹, Funck botanized at Caripe, Venezuela, in 1840. A second sheet is marked *Funck & Schlim* 228. Each consists of the summit of a flowering culm. The sheaths are tawny-hirsute, densely so at the junction with the blade. The immature racemes are ascending, forming a narrow panicle; the spikelets are 2.3 mm. long, the glume glandular-pubescent, the sterile lemma glabrous.

⁶¹ Musée Bot. Delessert 215. 1845.

Paspalum violascens Mez, Repert. Sp. Nov. Fedde 15: 73. 1917. "Trinidad, loco accuratiore haud indicato (Trinidad Bot. Gard. herb. no. 2175)." The type, bearing the name in Mez's script, was examined in the Berlin Herbarium. A duplicate is in the United States National Herbarium. These are relatively slender plants, about 1.1 meters tall, the foliage nearly glabrous except at the junction of sheath and blade. The immature racemes are ascending, as in *P. familiare*, and not more than 8 cm. long; the spikelets are more crowded than usual, 2 mm. long or slightly more, the glume glandular-pubescent, the sterile lemma glabrous.

DESCRIPTION

A slender to robust leafy perennial, commonly glaucous-purplish, in tough clumps of few to many culms from short hard rhizomes; culms 1 to 4 meters tall, at first simple, erect to leaning, later bearing appressed to divergent flowering branches from the lower nodes in plants in open ground, from nodes 1 to 2 meters above the base in plants growing in dense colonies or among brush, the stout woody culm remaining simple until overtopping the mass of vegetation, then branching, the branches often crowded and forming dense bunches in the

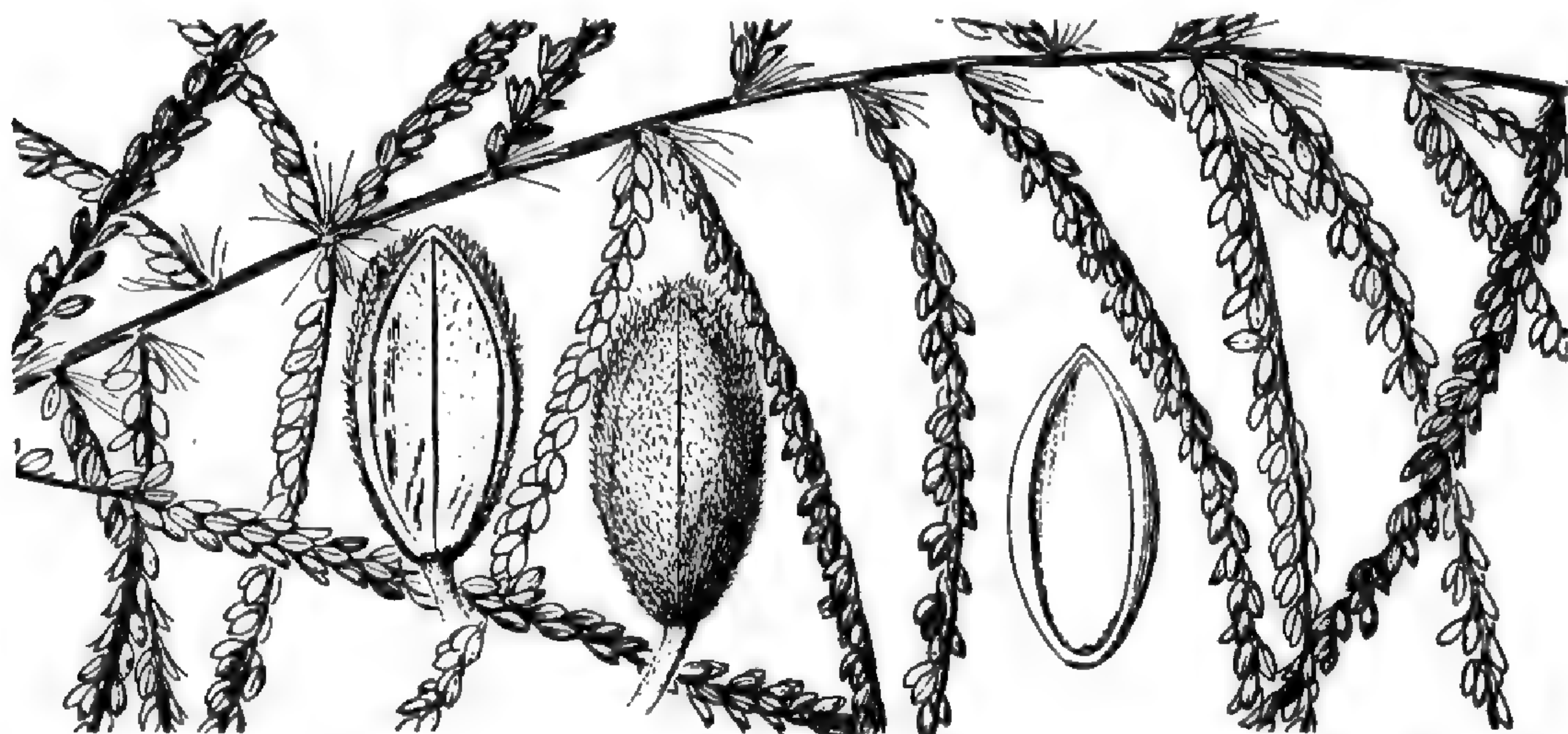


FIGURE 128.—*P. coryphaeum*. From type specimen of *P. pruinatum* and Chase 9058

open above the underlying thicket, the branches simple, leaning or drooping and much more slender than the main culm below; internodes from densely papillose-hirsute, at least below the nodes, to glabrous; nodes from conspicuously to minutely tawny appressed-hirsute; sheaths mostly overlapping, those at the base of the main culm and of the branches crowded, faintly keeled, the lower papillose-hirsute to nearly glabrous, the upper ciliate toward the summit, otherwise usually glabrous, the summit often slightly auricled; ligule firm, 1 to 3 mm. long; blades flat or the scabrous margins revolute, ascending to spreading, or reflexed in age, firm, 12 to 32 cm. long, 8 to 23 mm. wide, tapering to a rounded base, with a dense tuft of long hairs back of the ligule, from densely grayish puberulent on both surfaces to glabrous, except at the base, the midnerve thick and pale; panicles from nodding with ascending racemes when young to drooping or hanging with spreading to recurved or reflexed racemes when mature; racemes 10 to 45 (rarely fewer than 10), slender to rather thick, the lower 6 to 12 cm. long, on a slender angled glabrous to very sparsely pilose common axis 10 to 25 cm. long, rachis very slender (scarcely 0.5 mm. wide), purple, bearing copious long tawny hairs at the very base, otherwise glabrous or obscurely pubescent; spikelets in pairs on slender pedicels, from loosely to rather densely arranged, commonly loose at the base, denser above, and the upper racemes denser than

the lower, 2 to 2.5 mm. long, about 1 mm. wide, elliptic; glume and sterile lemma equal, barely covering the fruit (at maturity the tip of the fruit exposed on the back), rather thin in texture, 3-nerved, the nerves farther from the margin than in most species, the glume finely glandular-pubescent, the hairs longer toward the upper margin, the lemma sparsely pubescent to glabrous, both commonly dotted or blotched with purple; fruit pale, the lemma with 5 very obscure nerves or longitudinal ridges.

Herbarium specimens of this species present a wide range of variation, but this is largely due to the fact that the plants change in habit with age and the situation in which they grow. Field work in Brazil showed that restricted colonies of this grass change as described in the preceding paragraph. The type of *P. pruinatum* represents the most characteristic simple form. A panicle from a specimen very like this type (*Chase* 9058) was chosen for illustration (figure 128). The plants from the summit of Pão de Assucar (*Chase* 8156, 8393, and 9802) agree with the type of *P. coryphaeum*, having slightly larger spikelets and nearly glabrous blades. A specimen collected by the Wilkes Exploring Expedition in the Organ Mountains and *Chase* 7754 are like the type of *P. familiare*. Hitchcock's nos. 10107 and 10192, from Trinidad, though larger and overmature, are much like the type of *P. violascens*.

In the fruiting lemma in this species five faint longitudinal ridges are visible. These and the general resemblance to *Paspalum usteri* Hack. of Brazil, allied to *P. malacophyllum*, suggest the affinity of that group to this species. In *P. usteri* the fruiting lemma is not strongly ribbed and the second glume is developed, commonly half as long as the spikelet.

DISTRIBUTION

Savannas and campos, open or brushy slopes, river banks and wood borders, Panama and Trinidad to Brazil, from near sea level to 1,100 meters altitude.

PANAMA: Savanna de Alhajuela, *Pittier* 3478.

TRINIDAD: Botanic Garden, *Broadway* 2175, 5947. St. Joseph, *Hitchcock* 10183, 10184, 10186, 10192. California, *Hitchcock* 10107. La Brea, *Trinidad Bot. Gard.* 2262. Brighton, *Hitchcock* 10092.

BRITISH GUIANA: Rupununi Savanna, *Melville* 118.

BRAZIL: Marajó Island, *Goeldi* 201. Alto Rio Branco, *Kuhlmann* 3172. Pernambuco, *Chase* 7754; *Pickel* 1561. Serra do Cipó, *Chase* 9124, 9254, 9267, 9290. Lagoa Santa, *Chase* 9104. Bello Horizonte, *Chase* 8956, 8962, 9058, 9063. Ouro Preto, *Chase* 9372. Goyaz, *Glaziou* 22605a. Organ Mountains, *Wilkes Expl. Exped.* Tijuca, *Kuhlmann* in 1916. Rio de Janeiro, *Chase* 8156, 8393, 9802; *Glaziou* 13328, 18684. São Paulo, *Holway* 1482. Jundiáhy, *Holway* 1644.

Plicatula.—Perennials and annuals with purplish compressed culms and sheaths; racemes rather heavy; spikelets at first drab turning brown or dark olivaceous; fruit dark brown, shining.

Plants perennial.

Spikelets obovate, turgid.

Sterile lemma wrinkled just within the margin-----127. *P. plicatum*.

Sterile lemma flat-----131. *P. centrale*.

Spikelets elliptic, depressed, not turgid.

Spikelets 3 mm. long; blades flat-----130. *P. leptachne*.

Spikelets not more than 2.5 mm. long; blades folded or subinvolute.

Plants subaquatic; rachis 1.5 to 2 mm. wide-----128. *P. wrightii*.

Plants terrestrial; rachis 1 mm. wide-----129. *P. motembense*.

Plants annual.

Spikelets obovate; rachis less than 1 mm. wide. 133. *P. melanospermum*.

Spikelets suborbicular.

Culms mostly stout, rather succulent; spikelets brown. 134. *P. boscianum*.

Culms slender, not succulent; spikelets drab to olivaceous.

132. *P. convexum*.

127. *Paspalum plicatulum* Michx.

Paspalum plicatulum Michx. Fl. Bor. Amer. 1: 45. 1803. "Hab. in Georgia et Florida." The type specimen, in the Paris Herbarium, is a single culm, 40 cm. tall, with 3 racemes 3.5 to 5.5 cm. long. The foliage is glabrous, except for a few hairs at the base of the blade on the upper surface. The locality given on the label is "Georgia, Florida."

Paspalum undulatum Poir. in Lam. Encycl. 5: 29. 1804. "Cette plante a été recueillie à Porto-Ricco par le citoyen Ledru. (V. s. in herb. Lam.)." The type specimen, "de portorico Ledru," is in the Lamarck Herbarium in the Paris Herbarium. There are two culms, one with 5, the other with 10 racemes.

Paspalum lenticulare H. B. K. Nov. Gen. & Sp. 1: 92. 1816. "Novae Andalusiae in declivitate montis Cocollar, in valle Caripensi, et juxta Cumanacoa." In the Willdenow Herbarium is a specimen of *P. plicatulum* marked "Humboldt," but without locality. This has 15 racemes. In the Paris Herbarium is another specimen of *P. plicatulum* from the Bonpland Herbarium so named and marked "Novae Andalusie, Caripei, Cocollard, Cumanacou." One culm has 16, the other 8 racemes. In the Berlin Herbarium is a specimen of *P. virgatum* from the Kunth Herbarium named "*Paspalum lenticulare* Kunth, Nova Andalusia" in Kunth's script. The description appears to have been drawn chiefly from specimens of *P. plicatulum*, but the statement "spicae viginti aut quatuor et viginti" must have been based on the specimen of *P. virgatum*.

Paspalum gracile LeConte, Journ. de Phys. 91: 285. 1820. Not *P. gracile* Rudge 1805. "Habitat in Georgia." A LeConte specimen, with the name in his script, in the Academy of Natural Sciences, Philadelphia, is the upper part of a culm with 4 racemes. This is accepted as the type since it agrees with the description, though LeConte evidently based his description on additional material since he says "spicis 4-5." A specimen with 5 racemes appears to have been given to Richard. This, marked "Am. Sept. Mr. La Compte.," is now in the Drake Herbarium.

Paspalus leptos Schult. Mant. 2: 173. 1824. Based on *P. gracile* LeConte, the name presumably changed because of *P. gracile* Rudge. Schultes quotes LeConte's description.

Paspalum montevidense Spreng. Syst. Veg. 1: 246. 1825. "Monte Video. Sello." The type specimen was examined in the Berlin Herbarium. On the sheet is noted in Nees' script "*Paspalus plicatulus* var. γ β mihi."

Paspalum tenue Kunth, Rév. Gram. 1: 26. 1829. Not *P. tenue* Gaertn. 1791. Based on *P. gracile* LeConte.

Paspalum multiflorum Desv. Opusc. 58. 1831. "Crescit in Brasilio." A specimen from Brazil in the Paris Herbarium, bearing the name in Desvaux's script, is a tall slender culm of *P. plicatulum* with hairy foliage.

Paspalum orthos Schult.; Kunth, Enum. Pl. 1: 57. 1833. This name is given as a synonym of *P. tenue* Kunth, but *P. leptos* is evidently intended, since the place of publication of that name is cited.

Paspalum marginatum Spreng. in Steud. Nom. Bot. ed. 2. 2: 272, 1841, as synonym of *P. undulatum* Poir. Not *P. marginatum* Trin. 1826. A specimen so named in Sprengel's script is in the Berlin Herbarium.

Paspalum campestre Schlecht. Linnaea 26: 131. 1853. Not *P. campestre* Trin. 1834. "Sillae de Caracas, * * * (n. 392)," collected by Wagener. The type has not been located. The description agrees well with *Pittier* 7164, 7287, 7305, 9434, and 9756, all collected in the mountains near Caracas.

Paspalum atrocarpum Steud. Syn. Pl. Glum. 1: 25. 1854. "Ex Hrbo. *Urville* sine loco natali." The type specimen in the Dumont-d'Urville Herbarium at Caen bears the name in Steudel's script. It is a single complete plant 25 cm. tall, such as found in pastured land. No locality is given, but the plant probably came from southern Brazil.

Paspalum antillense Husnot, Bull. Soc. Linn. Normand. ser. 2. 5: 260. 1871. "Husn. no. 76. Route de la Basse-Terre au camp Jacob (Guad[eloupe])." Husnot's no. 76 was examined in the Brussels Herbarium, in the Paris Herbarium, and in the British Museum. These three specimens are *P. plicatulum* with blades long-ciliate on the margin toward the base. Husnot's no. 76 in the Institut Botanique of Montpellier is *P. melanospermum*. The description is not detailed enough to differentiate between the two species; but the specimen of *P. melanospermum*, having blades but sparsely ciliate, is rejected as the type, since Husnot emphasizes the long hairs toward the base of the blades.

Paspalum saxatile Salzm.; Doell in Mart. Fl. Bras. 2²: 76. 1877. The herbarium name of a specimen from Bahia, Brazil, cited as a synonym of *P. plicatulum*. A specimen of the Salzmann collection, "in umbrosis pr. Bahia," so named, is in the United States National Herbarium.

Paspalum decumbens Sagot; Doell in Mart. Fl. Bras. 2²: 77. 1877. Not *P. decumbens* Swartz 1788. A herbarium name of *Sagot* 1342, cited as synonym of *P. plicatulum*. The specimen, collected at Cayenne in 1859, was examined in the Drake Herbarium in Paris.

Paspalum plicatulum var. *intumescens* Doell in Mart. Fl. Bras. 2²: 78. 1877. "Prope Lagoa Santa in lacu juxta ripam (Warming)." The type, in the Doell Herbarium in Freiburg, is a specimen of *P. plicatulum* with nearly glabrous foliage and 4 racemes, the sterile lemma of most of the spikelets indurate, as in *Swallen* 453 from Florida.

Paspalum pauperculum Fourn. Mex. Pl. 2: 10. 1886. "San Luis Potosí (VIRL. n. 1320)." In the Fournier Herbarium in the Paris Herbarium are two sheets of Virlet's no. 1320. One consists of a fragmentary specimen of *P. pubiflorum*; no writing of Fournier's appears on the sheet. The other specimen consists of two small plants of *P. plicatulum*, one mounted alone, the other with the end of a flowering culm of *P. pubiflorum* mounted with it, the base concealed beneath the leafy base of the plant of *P. plicatulum*. On this sheet is an unpublished name, "n. sp.," in Fournier's script. Fournier's description appears to be based on the mixed specimen and applies to both parts, but the spikelets are described as glabrous and the fruit as shining brown, hence the plants of *P. plicatulum* are taken as the type.

Paspalum pauperculum var. *altius* Fourn. Mex. Pl. 2: 10. 1886. "Rio Blanco prope Orizaba (BOURG. n. 2033)." The number cited has not been located. It seems probable that it is a misprint for 2633, a tall specimen of *P. plicatulum* from the locality cited.

Panicum plicatulum Kuntze, Rev. Gen. Pl. 3²: 363. 1898. Based on *Paspalum plicatulum* Michx.

The name "plicatulum" is misspelled "plicatum" by Persoon.⁶²

DESCRIPTION

A rather slender perennial, in tufts of few to several culms, with numerous leafy shoots at base, sometimes with a short rhizome; culms ascending or suberect,

⁶² Syn. Pl. 1: 86. 1805.

often from a slightly decumbent base, 0.5 to 1 meter tall, rarely shorter or taller, glabrous, simple or with one or two branches from the lower nodes, rarely from the middle ones, the branches leafy like the primary culm; nodes glabrous, or the lower sometimes appressed-pubescent; sheaths keeled, glabrous or papillose-pilose along the margin and keel or rarely hirsute throughout, the lower crowded,



FIGURE 129.—*P. plicatulum*. From type specimen and Chase 7061.

commonly rather papery; ligule brown, 2 to 3 mm. long; blades mostly folded at base, flat or folded above, rather firm, erect or ascending, 10 to 50 cm. long, 3 to 10 mm. wide, the uppermost reduced, glabrous or more commonly papillose-pilose on the upper surface toward the base, sometimes, especially in the Tropics, papillose-pilose on both surfaces; racemes 2 to 19, commonly 3 to 10, 2 to 10 cm. long, usually arcuate-spreading, the common axis slender; rachis about 1 mm. wide, with a tuft of long hairs at the base; spikelets in pairs (one of the pair sometimes undeveloped), 2.1 to 3 mm. long, 1.4 to 2 mm. wide, commonly 2.5 to 2.8 mm. long, 1.8 mm. wide, obovate-oval, at first grayish, turning brown in drying and at maturity; glume and sterile lemma equal, thin in texture, 5-nerved, glabrous, or the glume often appressed-pubescent, the lemma at maturity with short transverse wrinkles just inside the slightly raised margin, rarely sparsely appressed-pubescent; fruit nearly the size and shape of the spikelet, dark brown and shining.

A species of wide range and somewhat variable habit, the culms slender and wiry to rather robust, the foliage varying from glabrous to conspicuously pilose, the spikelets glabrous to strongly pubescent on the glume, rarely on the sterile lemma. Specimens from the Tropics are more commonly pubescent than are those of the United States.

In *Swallen* 453 the sterile lemmas of all spikelets are brown-indurate except around the margins.

DISTRIBUTION

Open ground or wet wood borders, mostly in moist sandy or clay soil, Georgia, Florida, and west to Texas, south to Argentina and throughout the West Indies; an important constituent of the campos of Brazil.

GEORGIA: Savannah, *Kearney* 193. *Thalman*, *Chase* 7061.

FLORIDA: Pensacola, *Curtiss* 5923. Milton, *Swallen* 384, 453. Chipley, *Combs* 542, 561, 598, 607. Marianna, *Swallen* 497. Madison, *Combs* 214, 240. Madison County, *Hitchcock* 2497. Suwanee County, *Hitchcock* 2496. Lake City, *Bitting* 811, 895, 1195; *Combs & Rolfs* 85, 86; *Ricker* 889. Jacksonville, *Kearney* 166. Gainesville, *Chase* 4210; *Norton* 385c. Alachua County, *Hitchcock* 9216. Bronson, *Combs* 840. Levy County, *Hitchcock* 2501. Cedar Key, *Garber* in 1876. Eustis, *Nash* 216. Tampa, *Combs* 1392. Bartow, *Combs* 1185. Peace Creek, *J. D. Smith* in 1880.

ALABAMA: Mobile, *Kearney* 48; *Mohr* in 1878, 1883, 1884, 1890, and 1891.

MISSISSIPPI: Biloxi, *Kearney* 216; *Tracy* 3774, 4509. Ocean Springs, *Pollard* 1108.

LOUISIANA: Alexandria, *Ball* 613. Oberlin, *Ball* 231. Lake Charles, *Chase* 4391, 6074; *Tracy* 3673, 3686. Cameron, *Cocks* 2187; *Tracy* 8603. Crowley, *Webb* in 1912. Abbeville, *Langlois* 19. Covington, *Arsène* 12251.

TEXAS: Texarkana, *Eggert* in 1896. Bastrop, *Painter* in 1922; *Plank* 42. Giddings, *Egeling*. Rutersville, *Wright*. Tom Green County, *Tweedy* in 1880. College Station, *Hitchcock* 9218. Brazos County, *Nealley* in 1882. Waller County, *Thurrow* in 1898. Harvester, *Hitchcock* 1196. Houston, *Bebb* 1234, 1249; *Fisher* 65, 84. Hempstead, *Hall* 801; *Tharp* 3262. Columbia, *Bush* 340. Galveston, *Hitchcock* 9220. Port Lavaca, *Allen* 15. Rockport, *Chase* 6062. San Antonio, *Hitchcock* 5326. Robstown, *Griffiths* 6505½. Sarita, *Hitchcock* 5487, 9219. Without locality, *Nealley* in 1886.

SAN LUIS POTOSÍ: Las Canoas, *Hitchcock* 5764; *Pringle* 3772. Cárdenas, *Hitchcock* 5773½.

SINALOA: Rosario, *Rose* 1885.

NAYARIT (TEPIC): Acaponeta, *Rose* 3294.

JALISCO: Guadalajara, *Palmer* 190 and 468 in 1886.

VERA CRUZ: Jalapa, *Hitchcock* 6614. Córdoba, *Hitchcock* 6409, 6414. Orizaba, *Botteri* in 1856 and 1857; *Bourgeau* 2633, 2745, 2843; *Hitchcock* 6358, 6371. Mirador, *Liebmann* 182. Zacuapan, *Purpus* 3772, 3777, 8476. Coatzacoalcas, *Smith* 1054.

MORELOS: Cuernavaca, *Hitchcock* 6854, 6882½.

COLIMA: Colima, *Palmer* 144 in 1897. Alzada, *Hitchcock* 7057, 7059.

OAXACA: Efigenia, *Nelson* 2853.

CHIAPAS: Monserrate, *Purpus* 441.

GUATEMALA: Cobán, *Johnson* 440; *Popenoe* 899; *Türckheim* 3837. Secanquim, *Goll* 81. La Aurora, *Morales* 708. San Lucas Tolimán, *Heyde & Lux* (Dist. *Smith*) 6403. Guatemala City, *Hayes* in 1860; *Hitchcock* 9015. Quiriguá, *Standley* 23860. Between Las Amates and Izabal, *Blake* 7746. Puerto Barrios, *Standley* 24782, 24914, 25149. Santa Rosa, *Heyde & Lux* (Dist. *Smith*) 4101.

HONDURAS: San Pedro Sula, *Thieme* (Dist. *Smith*) 5593.

EL SALVADOR: Dept. Ahuachapán, *Padilla* 400. San Salvador, *Calderón* 492; *Standley* 19558, 20496, 22486, 23091, 23605, 23607, 23650; *Velasco* 3. Finca San Nicolás, *Choussy* A 17.

NICARAGUA: Masaya, *Hitchcock* 8642. Jinotepe, *Hitchcock* 8691, 8696.

COSTA RICA: Nuestro Amo, *Jiménez* 528. Bebedero, *Jiménez* 736, 743. Alajuela, *Jiménez* 175. San José, *Hitchcock* 8466, 8510. Port Limon, *Hitchcock* 8425. Pacaca, *Pittier* 3275. Boruca, *Tonduz* 4472. Buenos Aires, *Tonduz* 4863.

PANAMA: El Boquete, *Hitchcock* 8177, 8190, 8292, 8293. Dolega, *Hitchcock* 8339½. Aguadulce, *Pittier* 4914. Chorrera, *Hitchcock* 8124, 8138. Canal Zone, *Hitchcock* 7902, 7969, 7981, 7991, 7995, 8010, 8024; *Killip* 4012, 4031, 4099, 4116; *Maxon* 6514; *Piper* 5198, 5198½, 5206; *Pittier* 3725, 6731, 6763; *Standley* 25265, 26113, 28339, 28600, 30000, 32099. Matías Hernández, *Standley* 28979. Aguarubia, *Killip* 4280. Panamá, *Gervais* 163; *Hitchcock* 22953; *Standley* 25901, 26874, 29705. Las Cruces Trail, *Standley* 29094, 29124. Tabogo Island, *Pittier* 3622. Chepo, *Pittier* 4494. Camino del Boticario, *Pittier* 4551. Sabana de Juan Corso, *Pittier* 4742. Sabana de Dormisolo, *Pittier* 4648.

CUBA: Pinar del Río, *Wright* 3839. Between Sumidero and Pinar del Río, *Léon* 3470. Cayajabos, *Britton, Wilson & Léon* 6026. Herradura, *Hitchcock* 457; *Tracy* 9051, 9052. San Diego de los Baños, *Léon* 4557; *Léon & Hioram* 4363, 4461. Habana, *Léon* 926; *Tracy* 9117. Wajay, *Léon* 781. Madruga, *Léon* 3454. Santiago de las Vegas, *Baker* 33, 34, 2056; *Baker & Wilson* 596; *Hitchcock* 456; *Wilson* 420, 421. Cano, *Léon* 1989. Anafe Station, *Léon* 4333. Campo Florido, *Léon* 3462. Hanábana, *Wright* 768. Manacas, *Léon & Cazánás* 5844. Sancti Spiritus, *Léon* 927b, 5364. Tuinicú, *Léon* 927. Zaza del

- Sur, *Sergius* 2777. Placetas del Sur, *Léon* 6419. Isle of Pines, *Britton & Wilson* 14707; *Britton, Britton & Wilson* 15015, 15354, 15631; *Ekman* 12040; *Palmer & Riley* 947; *Taylor* 38.
- JAMAICA: Troy, *Harris* 12608; *Hitchcock* 9788; *Maxon* 2812. Lititz, *Harris* 12681, 12701. New Forest, *Hitchcock* 9843. Southern Manchester, *Harris* 12695. Savoy, *Harris* 11615. Ipswich, *Hitchcock* 9601. Bull Head Mountain, *Hitchcock* 9524, 9549. Between Ewerton and Moneague, *Hitchcock* 9443. Between Bog Walk and Spanish Town, *Hitchcock* 9290½. Bog Walk, *Ridley* 5. Gordontown, *Hart* 679; *Hitchcock* 9330. Guava Ridge, *Harris* 11289. Cold Spring Gap, *Harris* 11353. Castleton, *Harris* 11284. Castleton Gardens, *Hitchcock* 9392. Hope Gardens, *Hitchcock* 9319. Windsor, *Maxon & Killip* 1719.
- HAITI: Marmelade, *Leonard* 8079, 8241. St. Michel de l'Atalaye, *Ekman* H 8350; *Leonard* 7124, 7354, 7355, 7579. Kalacroix, *Leonard* 7853. Port-au-Prince, *Ekman* H 7115. Port-à-Piment, *Ekman* H 411. Furcy, *Leonard* 4296.
- DOMINICAN REPUBLIC: Azua, *Fuertes* 1846. Guaina Mica, *Eggers* 2547. Pimental, *Abbott* 632, 689.
- PORTO RICO: Mayaguez, *Britton & Cowell* 4070; *Chase* 6151; *Underwood & Griggs* 147. Maricao, *Sintenis* 358. Lares, *Chase* 6592. Salta de Morovis, *Chase* 6466. Coamo Springs, *Chase* 6546. Atolateja, *Goll* 235. Vega Baja, *Chase* 6430. Dorado, *Johnston* 1011. Bayamon, *Chase* 6644. Rio Piedras, *Cowgill* 423; *Johnston* 538. Trujillo Alto, *Chase* 6777; *Hioram* 320. Between Aibonito and Cayey, *Chase* 6339. Mameyes, *Chase* 6652. Juncos, *Sintenis* 2612.
- VIRGIN ISLANDS: St. Thomas, *Britton & Schafer* 375; *Eggers* 4. St. Croix, *Hitchcock* 16339; *Thompson* 254. Virgin Gorda, *Britton & Fishlock* 1097. Tortola, *Britton & Shafer* 764.
- LEeward ISLANDS: Guadeloupe, *Duss* 2673. Dominica, *Hitchcock* 16438.
- WINDWARD ISLANDS: Martinique, *Duss* 548, 720, 4011. St. Lucia, *Hitchcock* 16473; *Kemp* 7.
- TRINIDAD: Port of Spain, *Hitchcock* 9983. St. Ann, *Broadway* 4616. St. Joseph, *Hitchcock* 10190. San Fernando, *Hitchcock* 10112. La Brea, *Broadway* 4970. Pitch Lake, *Hitchcock* 10090. Without locality, *Broadway* in 1918.
- TOBAGO: Scarboro, *Hitchcock* 10213. Government House, *Broadway* 3148.
- COLOMBIA: Buenaventura, *Hitchcock* 19899. Savanna de San Martín, *Shaw* in 1927; *Dawe* 231. La Cumbre, *Pennell & Killip* 5949. Córdoba, *Killip* 5050. Zarzal, *Pennell, Killip & Hazen* 8470. Corinto, *Pittier* 992, 999. Toribio, *Pittier* 1472. Cauca Valley, *Lehmann* 3457. Popayán, *Lehmann* 5398.
- VENEZUELA: Mene Grande, *Pittier* 10581. Tovar, *Fendler* 1737; *Pittier* 12822, 12823. Between Tabay and Mucurubá, *Pittier* 12878. Caracas, *Pittier* 7164, 7287, 7305, 7386, 9434. San Lázaro, *Pittier* 9756. Los Teques, *Pittier* 6098. Barquisemito, *Funck & Schlim* 823.
- BRAZIL: Marajó Island, *Goeldi* 161, 206. Pernambuco, *Chase* 7659; *Pickel* 1395, 1402, 1583. Cachoeira, *Chase* 8092. Parafuso, *Chase* 7987. Bahia, *Salzmann*. Caldas, *Henschen* III. 1343xxx. Rio Ferto, *Glaziou* 22590. Lavras, *Chase* 8846, 8847. Oliveira, *Chase* 8863. Bello Horizonte, *Chase* 8973, 8976; *Holway* 1321. Lagoa Santa, *Chase* 9044. Serra do Cipó, *Chase* 9114, 9256, 9281. Barbacena, *Chase* 8672. Between Sitio and Dr. Sá Fortes, *Chase* 8677. Monte Serrat, *Chase* 8359. São João, *Holway* 1659. Lapa, *Holway* 1607. Alta da Serra, *Holway* 1504. São Caetano, *Holway* 1582. São Jose des Campos, *Löfgren* 3812. Serrinha, *Dusén* 16434. Campo de Serra Geral, *Ule* 1614. Rio Grande do Sul, *Malme* 117. Without locality, *Riedel*.

PARAGUAY: Puerto Casado, *Rojas* 2316, 2783, 2787. Río Apa, *Hassler* 8079. Villa Sana, *Fiebrig* 5190. San Salvador, *Rojas* 2720, 2730. Lower Río Pilcomayo, *Rojas* 114. Cordillera de Altos, *Fiebrig* 876.

URUGUAY: Cerro Largo, *Herter* (*Herb. Osten*) 18622a in part. Durazno, *Schroeder* (*Herb. Osten*) 18742. La Paloma, *Wetmore* 848. Montevideo, *Arechavaleta*; *Sello* 74, 781; *Lombardo* 1801.

BOLIVIA: Coripata, *Hitchcock* 22675. Río Pirai, *Herzog* 1345. Buena Vista, *Steinbach* 6873, 7036.

ARGENTINA: Posadas, *Ekman* 581, 582. Formosa, *Jørgensen* 2425. San Marcos, *Parodi* 12. Buenos Aires, *Parodi* (*Herb. Osten*) 15239.

128. *Paspalum wrightii* Hitchc. & Chase

Paspalum wrightii Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 310. 1917. "Type in the U. S. National Herbarium, no. 865562, collected in Cuba by Charles Wright (no. 3843)."

DESCRIPTION

A subaquatic perennial; culms 1.5 to 1.7 meters long, leafy to the summit, simple, lush, decumbent or floating at the base, with rootlets at the distant nodes; sheaths glabrous, the lower loose, overlapping, the upper close, elongate; ligule 1 mm. long; blades sub-erect, rather firm, 20 to 40 cm. long, about 5 mm. wide (the uppermost greatly reduced), involute toward the summit, scabrous on the margin and bearing a tuft of long hairs just back of the ligule; racemes 5 to 9, ascending, 4 to 8 cm. long, the common axis slender, 8 to 10 cm. long, not hairy in the axils or with one or two hairs only; rachis 1.5 to 2 mm. wide, glabrous, the margin minutely scabrous; spikelets in pairs, closely imbricate, 2.2 to 2.5 mm. long, about 1.4 mm. wide, elliptic to slightly obovate, glabrous; glume and sterile lemma equal, thin, slightly and irregularly wrinkled, 3-nerved or with an additional obscure pair near the margin; fruit about 2.2 mm. long, 1.2 mm. wide, elliptic, chestnut-brown, the rolled margins of the lemma pale.

DISTRIBUTION

Margin of pools and streams, Province of Pinar del Río, Cuba, sometimes forming extensive colonies.

CUBA: Pinar del Río, *Wright* 3843. Arroyo Mateo Sánchez, *Ekman* 17910; *Amer. Gr. Nat. Herb.* 978

129. *Paspalum motembense* Léon

Paspalum motembense Léon in Britton, Bull. Torrey Club 53: 457. 1926. "Grassy place, Sabana de Motembo, Santa Clara, Cuba (*Léon and Loustalot* 9354) * * *. The type specimen is preserved in the Herbarium of the New York Botanical Garden." Brother Léon's own specimen of this collection was lent for study. The spikelets are immature.



FIGURE 130.—*P. wrightii*. From type specimen

DESCRIPTION

A glabrous erect perennial with a short rhizome; culms 60 cm. tall, simple, compressed, leafy below; sheaths overlapping, keeled; ligule 1 to 1.5 mm. long; blades ascending, mostly folded, 20 to 30 cm. long, 5 to 8 mm. wide (opened out), the junction with the sheath inconspicuous, the base slightly narrower than the sheath, the long-acuminate apex convolute; racemes several (8 in the only specimen seen), ascending, the lower 4.5 to 5 cm. long, the upper gradually shorter, the slender angled common axis 15 cm. long; rachis 1 mm. wide, very narrowly winged; spikelets in pairs on short flat scabrous pedicels, rather crowded, 2.5 mm. long, 1.2 to 1.4 mm. wide, elliptic, brownish-yellow; glume and sterile lemma equal, thin, loose, slightly and irregularly wrinkled, the glume 5-nerved and very obscurely appressed-pubescent toward the summit, the lemma 3-nerved, glabrous; fruit 2.3 mm. long, brown, probably smooth and shining at maturity, the margins of the lemma pale.



FIGURE 131.—*P. motembense*.
From type specimen

This species is closely related to *Paspalum wrightii*, being distinguished chiefly by its terrestrial habit, its glabrous blades, its much narrower rachis, and by the very slightly wrinkled glume and sterile lemma.

Known only from the type collection.

130. *Paspalum leptachne* Chase, sp. nov.

DESCRIPTION

A rather robust nearly glabrous perennial, with a short woody rhizome; culms erect from a slightly curved base, 1.3 to 1.5 meters tall, strongly compressed, simple; sheaths slightly keeled toward the summit, rather loose, the lower overlapping, purplish, the lowermost short, bladeless and hirsute, the others sparsely pubescent along the margin toward the summit, otherwise glabrous; ligule 1.5 to 2 mm. long, lacerate; blades flat, spreading from an ascending base, rather firm, 20 to 30 cm. long, 7 to 10 mm. wide, the base equaling in width the summit of the sheath (the uppermost blade reduced), very minutely pubescent on the upper surface and near the base hirsute, the margin scabrous; racemes 8 or 9, narrowly ascending, 5 to 13 cm. long, the common axis about 15 cm. long, scabrous on the sharp angles; rachis 1.7 to 1.8 mm. wide, purplish-gray, with a few stiff hairs at the base; spikelets in pairs (one of the pair often undeveloped toward the base) on slender pedicels, 3 mm. long, 1.7 mm. wide, elliptic, subacute; glume and sterile lemma equal, subhyaline, fragile, commonly torn, rather faintly 5-nerved, tawny, the dark fruit

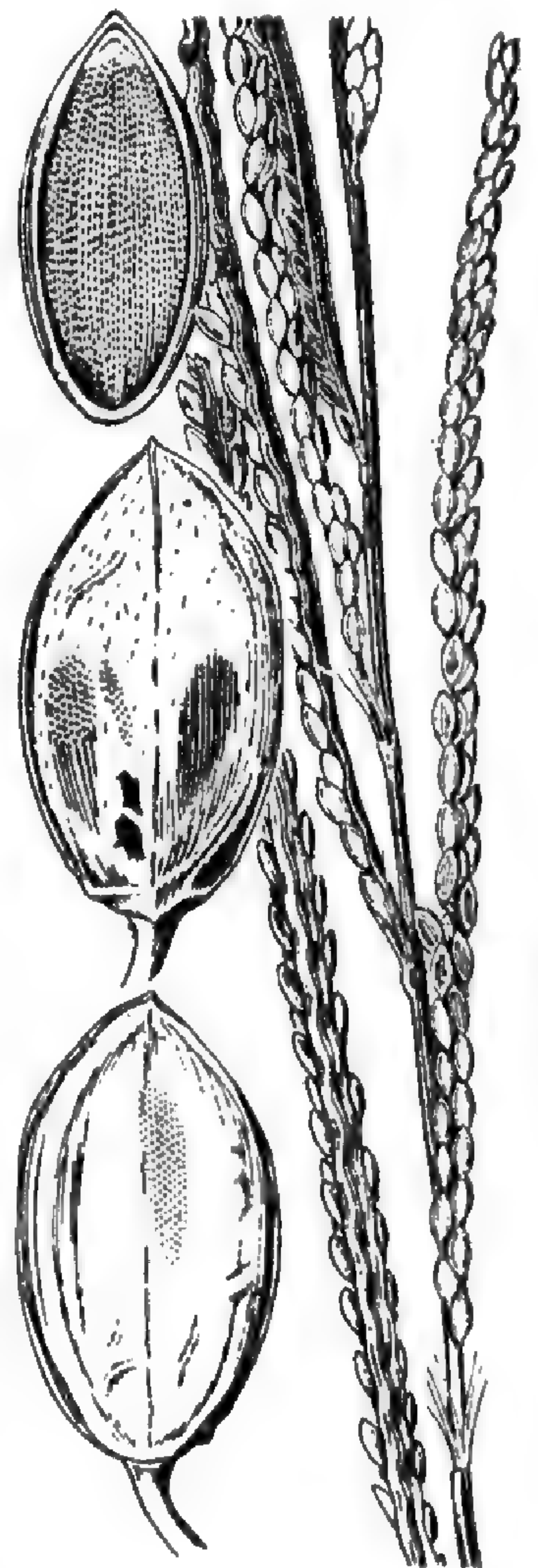


FIGURE 132.—*P. leptachne*.
From type specimen

showing through and its strong papillae impressed in places, the glume obscurely appressed-pubescent, the lemma sometimes slightly wrinkled near the margin; fruit about 2.6 mm. long, dark brown and papillose, the summit and base pale (possibly because immature).

Type in the U. S. National Herbarium, no. 300853, collected near Pedro Paulo, in the foothills of the Sierra Madre, Territorio de Tepic [now Nayarit], Mexico, August 3, 1897, by J. N. Rose (no. 1961).

Known only from the type specimen and a single duplicate. The species is related to *Paspalum motembense*, *P. wrightii*, and the South American *P. modestum* Mez, but there is nothing to suggest a subaquatic habit except that the culms appear to have been somewhat succulent toward the base.

131. *Paspalum centrale* Chase

Paspalum centrale Chase, Journ. Washington Acad. Sci. 17: 145. f. 2. 1927. "Type in the U. S. National Herbarium, no. 950876, collected in open flat meadow near the coast, La Union, El Salvador, November 13, 1911, by A. S. Hitchcock (no. 8789)."

DESCRIPTION

A rather low perennial, in small to rather dense and spreading tufts; culms often branching from the lower nodes, sometimes from the middle ones, ascending to spreading, occasionally geniculate and rooting at the lower nodes, 15 to 60 cm. long, usually 30 to 45 cm., ridged, glabrous; nodes glabrous; sheaths rather loose, mostly exceeding the internodes, from sparsely to conspicuously pilose, sometimes glabrous except near the margins, rarely throughout; ligule brown, 2 to 3 mm. long; blades flat, ascending, 5 to 25 cm. long, 3 to 10 mm. wide, commonly 10 to 20 cm. long and 5 to 7 mm. wide, the uppermost reduced, long-acuminate, about as wide at the base as the summit of the sheath, pilose throughout, often sparsely so or rarely subglabrous on the under surface; racemes 2 to 6, distant about one-fourth to two-thirds their length, or the upper closer, 2 to 7 cm. long, mostly spreading, often arcuate, the common axis slender, narrowly winged, rather stiff, sometimes bearing scattered long hairs toward the summits of the internodes; rachis 1 to 1.3 mm. wide, long-pilose at the base, the hairs sometimes as much as 10 mm. long, hispidulous and sometimes with a few scattered long hairs on the margins and on the midnerve above; spikelets mostly solitary (the secondary one of the pair rudimentary, or a few developed in some racemes), slightly or scarcely imbricate, 2 to 2.3 mm. long, 1.7 to 1.8 mm. wide, elliptic-obovate, olivaceous to brownish, glabrous; glume and sterile lemma barely or scarcely covering the fruit, rather fragile, 5-nerved, the outer one of the lateral pair of nerves sometimes obscure; fertile lemma and palea shining, very minutely papillose-striate, at first pale, turning dark brown.

This species is closely related to *Paspalum boscianum* Flüge, from which it differs in being perennial, not so coarse and less branching in habit, in the pilose foliage, and in the relatively slender racemes, with narrower rachises and mostly solitary, rather less turgid spikelets. The panicles of depauperate plants of *P. boscianum* with solitary spikelets resemble shorter-racemed panicles of *P. centrale*, but such plants are readily distinguished by the difference in foliage. The spikelets

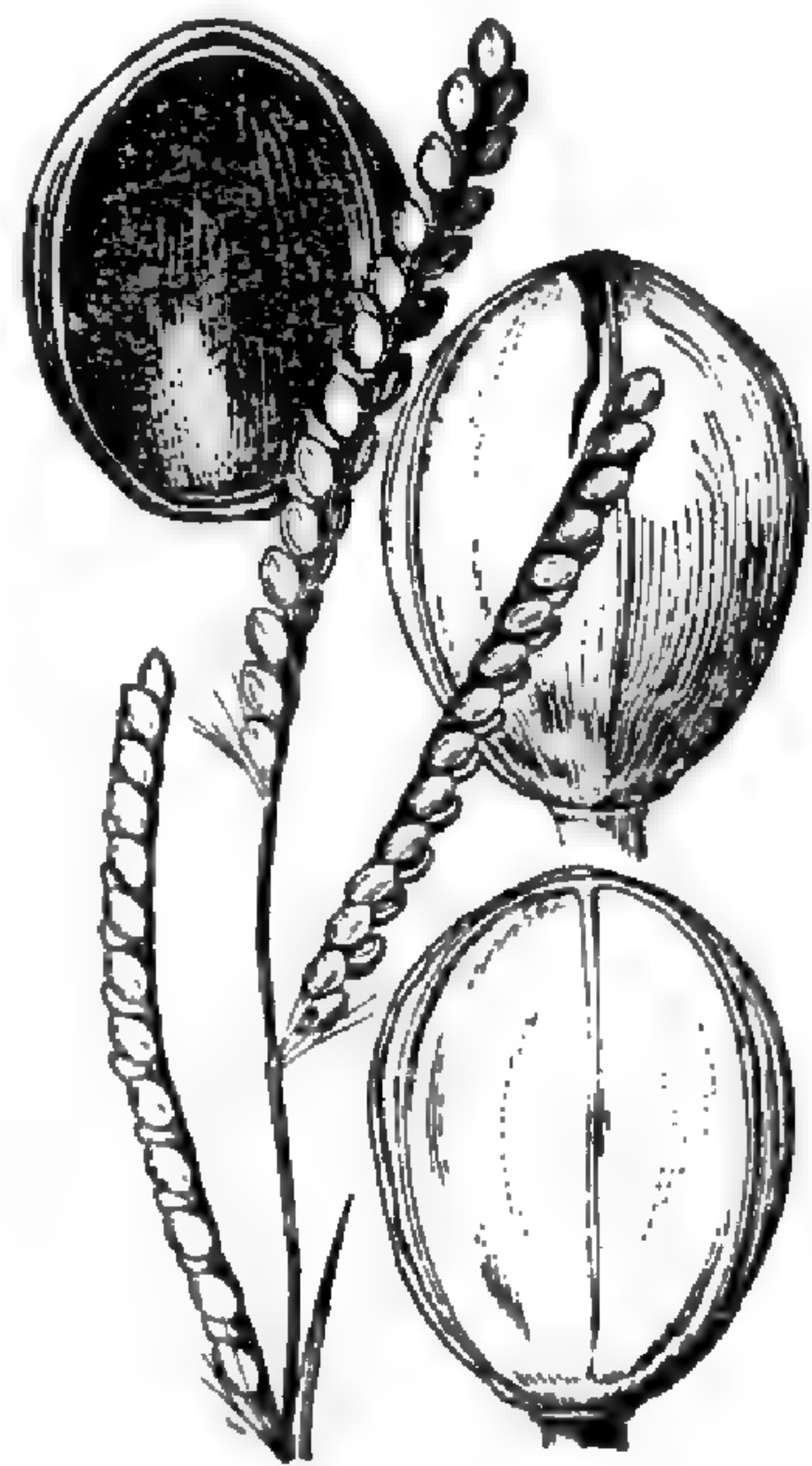


FIGURE 133.—*P. centrale*.
From type specimen

of *P. centrale* never assume the rust-brown color characteristically (but not constantly) found in those of *P. boschianum*. Some plants resemble *P. convexum* especially if the perennial character is not evident. The spikelets are always glabrous in *P. centrale*, less rounded, and usually smaller than in *P. convexum* and the lateral pair of nerves of the sterile lemma is obscure and very close to the intermediate pair, while in *P. convexum* the sterile lemmas are plainly 5-nerved.

DISTRIBUTION

Along ditches and in moist open ground near the coast, El Salvador to Panama.
 EL SALVADOR: Ahuachapán, *Padilla* 391. Acajutla, *Hitchcock* 8992. La Unión, *Hitchcock* 8788, 8789.
 NICARAGUA: Corinto, *Hitchcock* 8754.
 COSTA RICA: Puntarenas, *Hitchcock* 8532, 8543, 8544, 8569. Atenas, *Hitchcock* 8524½.
 PANAMA: Chiriquí, *Hitchcock* 8345. Canal Zone, *Hitchcock* 7985, 8004, 8005, 8008, 8059; *Pittier* 6817. Laguna de Portalo, *Pittier* 4621. Sabana de Juan Corso, *Pittier* 4527. Panama, *Standley* 26796, 27782. Chivi Chivi, *Killip* 4077. Matías Hernández, *Pittier* 6760, 6779.

132. *Paspalum convexum* Humb. & Bonpl.

Paspalus convexus Humb. & Bonpl. in Flüge, Monogr. Pasp. 175. 1810. "Jorullo. Humboldt et Bonpland." In the Nova Genera⁶³ the locality is given as the Volcano Jorullo [Michoacán], Mexico. The Humboldt and Bonpland specimen in the Berlin Herbarium bears the name in Kunth's script. Specimens of this collection were examined also in the Willdenow Herbarium, in the Paris Herbarium, and in the British Museum. In these the sheaths are glabrous or bear a few papillae only, the blades are papillose-pubescent on both surfaces, and the spikelets are glabrous, 2.8 mm. long.

Paspalum villifolium Steud. Syn. Pl. Glum. 1: 20. 1854. "Lhotsky legit verosimiliter in Brasilia." The type specimen, bearing the name in Steudel's script, is in the Paris Herbarium. It is a small plant with pubescent foliage and sparsely appressed-pubescent spikelets about 2.5 mm. long.

Paspalum ancylocarpum Nees; Steud. Syn. Pl. Glum. 1: 27. 1854. "Lhotsky legit in Brasilia." The type specimen, in the Berlin Herbarium, bearing the name in Nees' script, consists of three small plants with pubescent foliage and nearly glabrous spikelets 2.5 mm. long.

Paspalum hemicryptum Wright, Anal. Acad. Cienc. Habana 8: 204, 1871; Wright & Sauv. Fl. Cubana 196. 1873. "3847 [Wright] El Salado * * * San Cristobal," Cuba. The type in the Herbarium Sauvalle, Academia de Ciencias de la Habana, consists of two depauperate tufts with conspicuously pilose foliage, the nearly glabrous spikelets 2.2 to 2.3 mm. long.

Paspalum convexum Willd.; Doell. in Mart. Fl. Bras. 2²: 79, 1877, as synonym of *P. ancylocarpum* Nees.

Paspalum inops Vasey, Contr. U. S. Nat. Herb. 1: 281. 1893. "Collected at Guadalajara [Mexico] by Dr. Edward Palmer (no. 592) in 1866." The type, in the United States National Herbarium, consists of two plants 25 and 30 cm. tall, with pubescent foliage, the spikelets 2.3 to 2.5 mm. long, obscurely appressed-pubescent.

Paspalum inops var. *major* Vasey in Beal, Grasses N. Amer. 2: 89. 1896. "Mexico, Pringle 1875." The type specimen, in the United States National Herbarium, collected in "sandy alluviums of canyons, Sierra Madre, Chihuahua," Mexico, is a larger plant than the type of *P. inops*, the stouter culms 40 to 45

⁶³ H. B. K. Nov. Gen. & Sp. 1: 91. 1816.

cm. tall, the sheaths glabrous, the blades only sparsely pilose toward the base, and the glabrous spikelets 2.7 to 3 mm. long.

Paspalum comosum Flügge; Knuth, Repert. Sp. Nov. Fedde 88 (Beih.): 106. 1926. Listed without description, "ex herb. Pittier. Miranda: Valencia (Pittier n. 8638)," in a catalogue of the flora of Venezuela. This collection in the United States National Herbarium is *Paspalum convexum* Flügge. The name "comosum" is doubtless an error for "convexum." Valencia is in the State of Carabobo, not in Miranda. The same collection with correct locality is cited as *P. convexum* on the same page by Knuth.

DESCRIPTION

A tufted leafy annual, branching at the base; culms suberect to geniculate-ascending, sometimes widely spreading, usually with short leafy flowering branches from the lower and middle nodes, 10 to 75 cm. usually 20 to 40 cm. tall, glabrous; nodes glabrous; sheaths loose, mostly shorter than the internodes, from glabrous to conspicuously papillose-pilose; ligule brown, fragile, about 2 mm. long; blades flat, ascending, rather lax, 5 to 23 cm. long, 3 to 11 mm. wide, commonly 8 to 15 cm. long and 5 to 10 mm. wide, the uppermost usually reduced but sometimes about as large as the others, commonly scarcely wider at base than the sheath, but sometimes broader and somewhat clasping, from conspicuously papillose-pilose to short-pubescent or sparsely pilose toward the base only; racemes 1 to 4, commonly 2 or 3, thick, ascending or spreading at maturity, 1.5 to 7 cm., commonly 2 to 4 cm., long, usually distant half to two-thirds their length, the common axis slender, flexuous, glabrous; rachis 1 to 2 mm. wide, long-pilose at the base, otherwise glabrous; spikelets in pairs, crowded, 2.2 to 3 mm. long, nearly as wide, obovate-suborbicular, turgidly plano-convex, drab to olivaceous; glume and sterile lemma scarcely covering the fruit at maturity, rather thin, 5-nerved, appressed-pubescent to glabrous; fruit broadly-obovate, dark brown, shining.

Like many weedy annuals this species is exceedingly variable, plants of cultivated ground being large and luxuriant and bearing spikelets up to 3 mm. long, while those of sterile places are dwarfed and bear spikelets only 2.2 to 2.5 mm. long. Subglabrous foliage is found in larger plants only, but many large plants are as pubescent as the smaller ones. The larger spikelets are found usually in the larger plants, but some of them have spikelets only 2.5 mm. long.

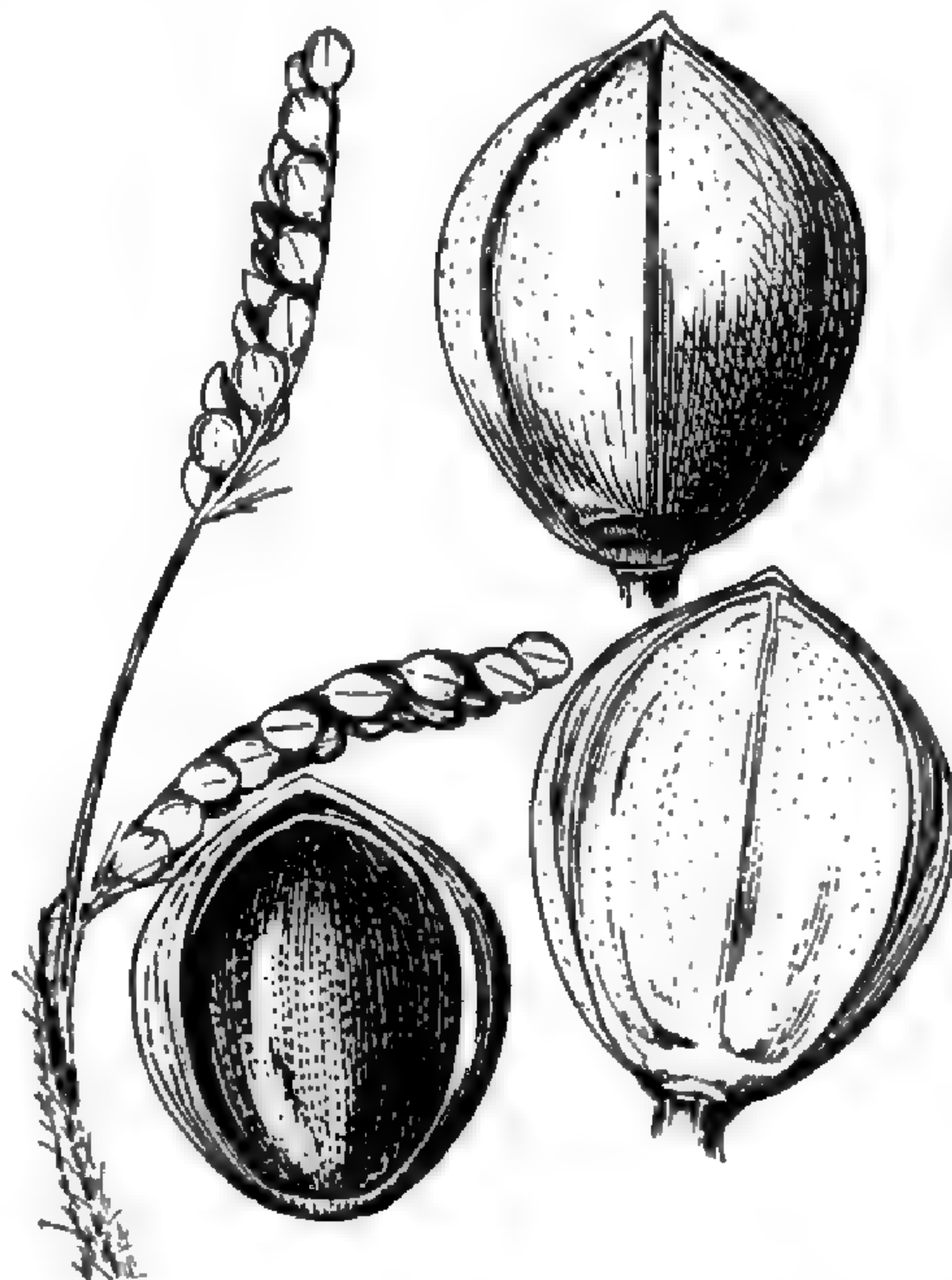


FIGURE 134.—*P. convexum*. From type specimen of *P. inops*

DISTRIBUTION

Open ground, cultivated and waste places, northern Mexico to Brazil; also in Cuba and Trinidad, probably introduced.

CHIHUAHUA: Sierra Madre, *Pringle* 1175, 1875.

SINALOA: Lodiago, *Palmer* 1658 in 1891.

ZACATECAS: Plateado, *Rose* 2781.

DURANGO: Durango, *Hitchcock* 7592. Without locality, *García* 644, 786.

JALISCO: Guadalajara, *Palmer* 592 in 1886; *Pringle* 11761. San Pedro, *Hitchcock* 7284, 7290. San Nicolás, *Hitchcock* 7190, 7221, 7222, 7223. Zapotlán, *Hitchcock* 7120, 7134. Valencia, *Hitchcock* 7005. La Junta, *Hitchcock* 6999.

GUANAJUATO: Guanajuato, *Dugès* in 1897.

VERA CRUZ: Jalapa, *Hitchcock* 6657. Coatepec, *Hitchcock* 6668.

PUEBLA: Puebla, *Arsène* 2284a.

MEXICO: Federal District, *Pringle* 6427, 9583.

MORELOS: Cuernavaca, *Hitchcock* 6830, 6863, 6868; *Orcutt* 3889.

MICHOACÁN: Uruápan, *Hitchcock* 6957, 6958, 6993, 6994. Morelia, *Arsène* 2478, 2644a.

COLIMA: Alzada, *Hitchcock* 7064.

GUERRERO: Santa Fé, *Hitchcock* 6692.

MEXICO (Republic of): "Mezquitan" *Oliva* 97.

GUATEMALA: Cobán, *Türckheim* 3830; *Johnson* 6. Guatemala City, *Hitchcock* 9017, 9095. Volcano Pacaya, *Kellerman* 6245.

EL SALVADOR: Volcano San Salvador, *Hitchcock* 8931, 8953.

NICARAGUA: Masaya, *Hitchcock* 8659. Jinotepe, *Hitchcock* 8703.

COSTA RICA: Puntarenas, *Wercklé* in 1917. San José, *Tonduz* 3017. Santa María de Dota, *Standley* 42488. Guadalupe, *Hitchcock* 8474. San Rafael de Cartago, *Pittier* 6982. San Francisco de Guadalupe, *Pittier* 9036, 9049. Atenas, *Hitchcock* 8522½, 8524.

PANAMA: Dolega, *Hitchcock* 8332. David, *Hitchcock* 8369. Aguadulce, *Pittier* 4959. Río Tecumen, *Standley* 29397. Nuevo San Francisco, *Standley* 30752.

CUBA: El Salado, *Wright* 3847. Gamboa, *Ekman* 15008.

TRINIDAD: La Brea, *Broadway* 4983.

VENEZUELA: Guarico, *Pittier* 12509. Valencia, *Pittier* 8638. Caracas, *Bailey* 56, 273.

BRAZIL: Serra do Cipó, *Chase* 9109, 9162. Lagoa Santa, *Chase* 8989, 9043.

133. *Paspalum melanospermum* Desv.

Paspalum melanospermum Desv. in Poir. in Lam. Encycl. Suppl. 4: 315. 1816. "Cayenne [French Guiana] (* * * herb. Desv.)." The type has not been located. The description and the comparison with *P. coromandelianum* and *P. scrobiculatum* (so called) suggested the form described under this name in Grasses of the West Indies⁶⁴ but in the present paper referred to *P. boscianum*. Later collections from British Guiana show that the common form of that region is the one with wrinkled spikelets, described as *P. olivaceum* in Grasses of the West Indies. Hence that is probably the form described as *P. melanospermum*.

Paspalum amazonicum Trin. Linnaea 10: 294. 1836. "Ega, ad fl. Amaz." This is described in a paper on the grasses of tropical America collected by Pöppig. The type specimen was examined in the Trinius Herbarium by A. S. Hitchcock, and a duplicate by the writer in the Vienna Herbarium.

Paspalum humile Steud. Syn. Pl. Glum. 1: 25. 1854. "*P. caespitosum*. Hochst. Hrbr. Kappler nr. 1543, non Flügg. Surinam." The type specimen, bearing the name in Steudel's script, was examined in the Drake Herbarium in Paris. It is a small, erect plant like *Broadway* 15.

Paspalum caespitosum Hochst.; Steud. Syn. Pl. Glum. 1: 25, 1854, as synonym of *P. humile*. This name and *Kappler* 1543 are cited by Doell⁶⁵ under *P. plicatulum* Michx., *P. plicatulum* var. *microspermum* Doell, and *P. dissectum* L.

Paspalum plicatulum var. *microspermum* Doell in Mart. Fl. Bras. 2²: 78. 1877. "*Paspalum caespitosum* Hochstetter et *Paspalum humile* Steud. * * * prope Villa de Uberava et Lagoa Santa prov. Minarum (Regnell III. n. 1343) * * * Surinamia (*Kappler* n. 1543.)" Several collections from different localities were distributed under Regnell no. III. 1343, followed by one or more x's. None has been found from the localities cited. Specimens of *Regnell* III. 1343 x and

⁶⁴ Contr. U. S. Nat. Herb. 18: 311. 1917.

⁶⁵ Mart. Fl. Bras. 2²: 76, 78, 79. 1877.

xx belong to *P. yaguaronense* Henr. *Kappler* 1543 is taken as the type of *P. plicatulum* var. *microspermum*.

Paspalum olivaceum Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 310. 1917. "Type in the U. S. National Herbarium no. 559837, collected in the island of Guadeloupe, September 23, 1897, by Père Duss (no. 3915)."

DESCRIPTION

A leafy nearly glabrous annual, olivaceous when dry, commonly purplish stained; culms glabrous, slightly fleshy, compressed-striate when dry, 40 to 70 cm. long, ascending from a decumbent base, often rooting at the lower nodes, finally bearing simple ascending floriferous branches; sheaths loose, thin, compressed; ligule erose, 1.5 to 2 mm. long; blades lax, erect, at least at the flat or folded base, commonly 10 to 15 cm. long, rarely 20 cm. long, 5 to 10 mm. wide, usually pilose on the upper surface at base, otherwise glabrous; panicle short-exserted from the bladeless upper sheath, the slender subflexuous axis 4 to 8 cm. long of 2 to 7 arcuate-spreading racemes, 1 to 6 cm. long; rachis scarcely 1 mm. wide, a few long hairs at the base; spikelets mostly in pairs, 2 mm. long, 1.5 mm. wide, obovate, strongly convex on the back, chestnut to rust-brown; glume and sterile lemma equal, 5-nerved, thin and commonly torn, glabrous or the glume obscurely strigose, the lemma often minutely wrinkled inside the slightly raised margin; fruit obovate-hemispherical, dark brown, shining.

DISTRIBUTION

Open, mostly moist ground, Guadeloupe, Martinique, and northern South America to the Amazon valley.

LEEWARD ISLANDS: Guadeloupe, *Duss* 3915; *Husnot* 76 in part.

WINDWARD ISLANDS: Martinique, *Duss* 4012; *Hitchcock* 16445.

COLOMBIA: Santa Marta, *Smith* 124.

VENEZUELA: Dividivi, *Pittier* 10835, 10861.

BRITISH GUIANA: Morawhanna, *Hitchcock* 17470. Parika, *Hitchcock* 16812. Lama, *Jenman* 6004. Penal Settlement, *Hitchcock* 17064, 17102. Kyk-over-al Island, *Hitchcock* 17198. Wismar, *Hitchcock* 17279. Akyma, *Hitchcock* 17427, 17438. Rockstone, *Gleason* 635. Tumatumari, *Gleason* 24; *Hitchcock* 17339. Rupununi Savanna, *Melville* 145.

DUTCH GUIANA: "Surinam," *Weigelt* in 1827.

FRENCH GUIANA: Cayenne, *Broadway* 15. Without locality, *Leprieur* 80, 87.

BRAZIL: Marajó Island, *Goeldi* 288, 293. Pará, *Goeldi* 28; *Huber* in 1907.

BOLIVIA: Buena Vista, *Steinbach* 5459.

134. *Paspalum boscianum* Flüge

Paspalum virgatum Walt. Fl. Carol. 75. 1788. Not *P. virgatum* L. 1759. Presumably described from South Carolina. No specimens of *Paspalum* are found in Walter's herbarium.⁶⁶

Paspalus boscianus Flüge, Monogr. Pasp. 170. 1810. "*Paspalum brunneum*. Bosc. inedit. * * * In Carolina detexit Clarissimus Bosc, qui mecum exemplaria communicavit." The type has not been located, but the detailed

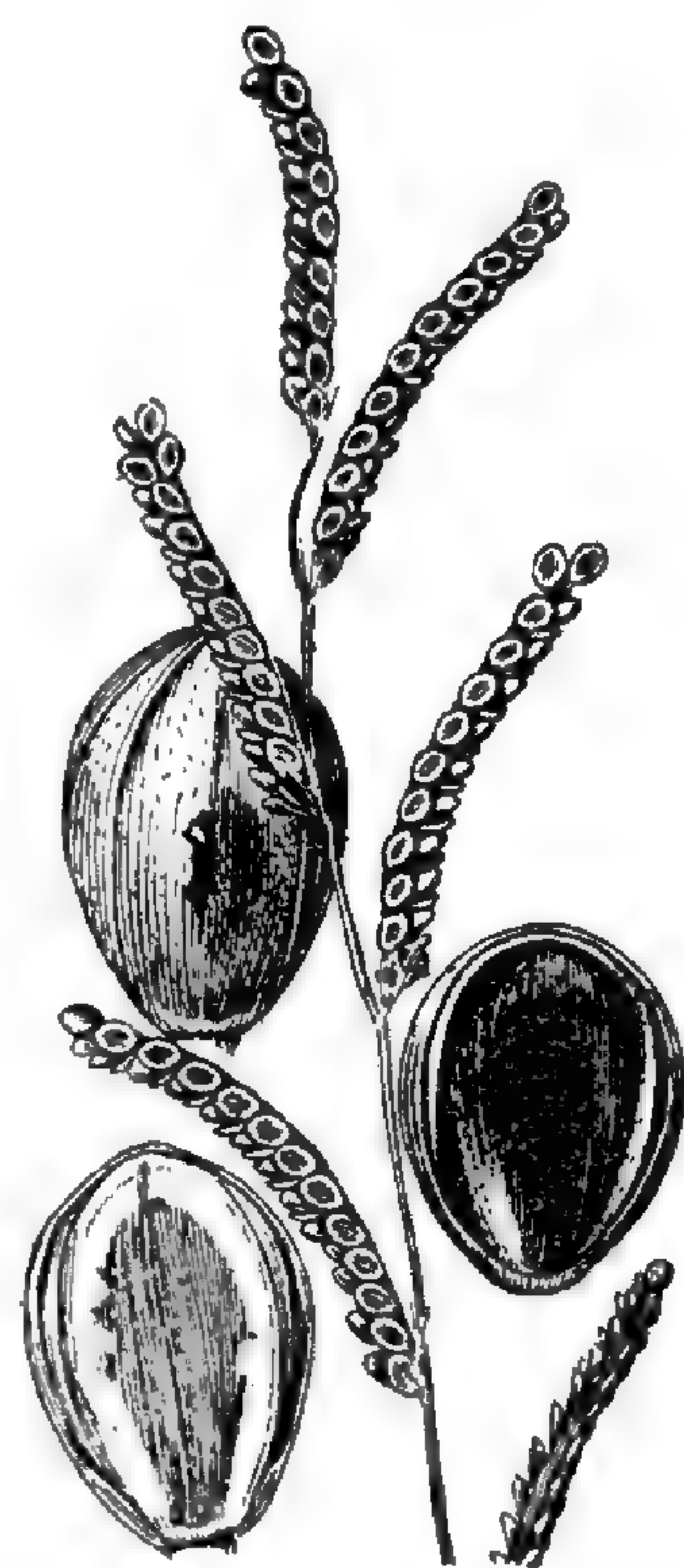


FIGURE 135.—*P. melanospermum*. From type specimen of *P. olivaceum*

⁶⁶ See Ann. Rep. Mo. Bot. Gard. 16: 41. 1905.

description leaves no uncertainty. A specimen in the Willdenow Herbarium at Berlin received from North America as *Paspalum brunneum* and on which the name "*Boscianum*" is written is possibly part of the type material. The spikelets are paired below, but solitary toward the ends of the racemes.

Paspalum brunneum Bosc; Flüge, Monogr. Pasp. 171. 1810, as synonym of *P. boscianum*.

Paspalum purpurascens Ell. Bot. S. C. & Ga. 1: 108. pl. 6, f. 3. 1816. "Grows in moist soils. Common," presumably about Charleston, South Carolina. The type specimen was examined in the Elliott Herbarium in the Charleston Museum. The detailed description also identifies the species.

Paspalum confertum LeConte. Journ. de Phys. 91: 285. 1820. "Habitat in Georgia." The LeConte specimen bearing this name in the herbarium of the Academy of Natural Sciences, Philadelphia, is the upper part of a large plant with a mature inflorescence.

Paspalum virgatum var. *purpurascens* Wood, Class-book 781. 1861. Based on *P. purpurascens* Ell.

The species described by Muhlenberg⁶⁷ as *P. virgatum* L. is *P. boscianum*.



FIGURE 136.—*P. boscianum*. From Kearney 152

DESCRIPTION

A rather succulent annual, branching at the base and commonly from the middle nodes, usually conspicuously brownish purple, glabrous as a whole; culms 20 cm. to 1 meter, commonly 40 to 60 cm., long, ascending to widely spreading, sometimes rooting at the lower nodes, drying ridged; sheaths longer than the internodes, broad and loose, with a thin rusty-brown margin, the lowermost rarely pilose; ligule brown, 2 to 3.5 mm. long; blades flat, ascending, 10 to 40 cm. long, 6 to 18 mm. wide, commonly 15 to 30 cm. long and 8 to 10 mm. wide, about as wide at the base as the summit of the sheath or slightly wider and rounded, papillose-pilose on the upper surface toward the base, the hairs as much as 5 mm. long, scabrous on the margin, otherwise glabrous; racemes 2 to 15, commonly 4 to 11 in depauperate plants or on branches sometimes solitary, 2.5 to 9 cm. long, commonly 4 to 7 cm. thick, finally spreading, approximate on an angled, rather stiff slender axis, often forming somewhat heavy short-exserted panicles; rachis 2 to 2.5 mm. wide with a thick midrib and firm wings, scabrous on the margin and with a tuft of long hairs at the base; spikelets in pairs (the inner one of the pair sometimes undeveloped), crowded, 2 to 2.2 mm. long, 1.7 to 2 mm. wide, obovate-suborbicular, strongly plano-convex, glabrous, ashy gray turning to rusty brown, often conspicuously contrasting with the gray-green rachis; glume

⁶⁷ Descr. Gram. 94. 1817.

and sterile lemma barely covering the fruit, rather fragile, 5-nerved, the lateral pair of nerves closely parallel and near the margin; fruit dark brown, shining, very minutely papillose-striate.

Small slender specimens with 1 to 4 racemes and spikelets mostly solitary (one of the pair undeveloped) are the form described by Nash⁶⁸ as *Paspalum scrobiculatum* L. The fertile lemma is said to be "scrobiculate." This can only refer to the lunate line of thin texture through which the radicle pushes in germination and which is well marked in all species of *Paspalum* and *Panicum* with strongly indurate fertile lemmas. In Linnaeus's description of *Paspalum scrobiculatum* (see p. 228) he says of the flatter valve of the calyx (the sterile lemma) "in medio pari scrobiculorum impresso."

The Porto Rico specimens are relatively small slender plants, but the spikelets are mostly in pairs. This form was listed as *P. boscianum* by Nash in the grasses of Porto Rico⁶⁹ but in Hitchcock and Chase's Grasses of the West Indies⁷⁰ it was described under the name *Paspalum melanospermum* Desv. (Small specimens from Florida were the basis for including that State in the range given.) As in other species of this group, the sterile lemma is occasionally indurate like the fertile lemma or partly indurate.

This species, called bull-grass, bull-paspalum, and purple paspalum, furnishes a good hay in the Southeastern States. It is especially valuable for dairy cows, but is hard to cure.

DISTRIBUTION

Moist or wet open ground, along ditches and ponds, and sometimes a weed in cultivated fields, Virginia to Florida and Louisiana; also in Guatemala, Panama, Porto Rico, and northern Brazil. A specimen was found on ballast grounds, Philadelphia, Pa., in October, 1879, by Burk.

PENNSYLVANIA: Philadelphia, *Burk* in 1879.

VIRGINIA: Dismal Swamp, *Chase* 3670. Norfolk County, *Kearney* 2341.

NORTH CAROLINA: West Raleigh, *Stanton* 1288. Elizabeth City, *McCarthy* in 1883. Newbern, *Kearney* 1951. Wilmington, *Canby* in 1867; *Hitchcock* 9222; *Kearney* 281. Eastern North Carolina, *McCarthy* in 1884 and 1885. Without locality, *Curtis*.

SOUTH CAROLINA: Oconee County, *Anderson* 1406, 1539. *Anderson*, *Davis* 7905. Florence, *Ball* 684. Aiken, *Ravenel*. Orangeburg, *Hitchcock* 9223.

GEORGIA: Lafayette, *Harper* 351. Dalton, *Harper* 367. Currahee Mountain, *Small* in 1894. Stone Mountain, *Chase* 4510; *Hitchcock* 9224. Augusta, *Kearney* 205; *McCarthy* in 1888. Milledgeville, *J. D. Smith* in 1884. Macon, *J. D. Smith* in 1883. Bibb County, *J. D. Smith* in 1883. Without locality, *Chapman*.

FLORIDA: Pensacola, *Combs* 522. Chipley, *Combs* 566. Bay Head, *Combs* 640. Chattahoochee, *Tracy* 3663. Quincy, *Combs* 395, 423. Tallahassee, *Combs* 384; *Nash* 2346. Monticello, *Combs* 310, 322. Jefferson County, *Hitchcock* 2495. Madison, *Combs* 242, 293. Lake City, *Combs & Rolfs* 124, 159; *Rolfs* 819. Jacksonville, *Combs* 36; *Curtiss* 3573, 4025, 5022, 5745, 5760; *Kearney* 152. Gainesville, *Combs* 746. Fort Myers, *Standley* 18884. Without locality, *Chapman*.

TENNESSEE: Knoxville, *Ruth* 77. Hiawassee Valley, *Ruth* in 1892 and 1893. Blount County, *Gayle* in 1890.

ALABAMA: Scottsboro, *Chase* 4496. Cullman County, *Eggert* in 1897. Tuscaloosa, *Smith* in 1877. Tysonville, *Hitchcock* 9227. Chehaw, *Hitchcock* 9226.

⁶⁸ In *Small*, Fl. Southeast. U. S. 74. 1903.

⁶⁹ Bull. Torrey Club 30: 376. 1903.

⁷⁰ Contr. U. S. Nat. Herb. 18: 311. 1917.

- Auburn, *Tracy* 3959. Tuskegee, *Carver* 91. Mobile, *Curtiss* 6509; *Hitchcock* 9225; *Kearney* 36; *Mohr* in 1880.
- MISSISSIPPI: Starkville, *Kearney* 8; *Tracy* (*Pollard Dist.*) 1411. Woodville, *Phares* in 1878. Moss Point, *Tracy* 4630. Biloxi, *Chase* 4355; *Tracy* 4629. Ocean Springs, *Tracy* 119.
- LOUISIANA: Calhoun, *Ball* 39. Oberlin, *Ball* 216. Cotes Blanches, *Langlois* in 1884. Plaquemines Parish, *Langlois* 26.
- GUATEMALA: Cobán, *Türckheim* (*Dist. Smith*) 66. Cubilquitz, *Türckheim* (*Dist. Smith*) 7795. Chamá, *Johnson* 454.
- PANAMA: David, *Hitchcock* 8359. Chivi Chivi, *Killip* 4084. (Both collections have spikelets with indurate sterile lemmas and the first glume mostly developed.)
- PORTO RICO: Mayaguez, *Chase* 6172. Maricao, *Chase* 6234. Sierra Laquillo, *Chase* 6724; *Hioram* 367.
- VIRGIN ISLANDS: St. Thomas, *Herb. Ventenat* (*Delessert Herb.*).
- BRAZIL: Marajó Island, *Goeldi* 290.

PASPALUM SCROBICULATUM L. (*Mant.* 1: 29. 1767. "Habitat in India orientali."), a shorter, stouter, more freely branching and more prolific species with larger spikelets, unequally biconvex rather than plano-convex, the glume and sterile lemma 7-nerved, the latter more or less wrinkled (scrobiculate), was found on ballast at Camden, N. J. (*Martindale* in 1879) and at Abilene, Tex. (*Bentley* in 1899). Doctor Stapf⁷¹ says that the original *P. scrobiculatum* of Linnaeus represents the cultivated form of India, and renames it "*P. scrobiculatum* var. *frumentaceum* Stapf." It is to this cultivated form that Linnaeus' detailed description applies and not to the several species of the Old World that are commonly called *P. scrobiculatum*, nor to forms of the American *P. boscianum*.

Malacophylla. (*Anachyris* Nees; *Paspalum* Sect. *Eremachyrion* Doell;⁷² *P.* Subsect. *Anachyris* Benth. & Hook.⁷³).—Perennials with panicles of several to many racemes; spikelets concavo-convex, both glumes suppressed (reduced only in one Brazilian species), the fertile lemma strongly longitudinally ridged. Only one of the 5 species represented in North America.

135. *Paspalum malacophyllum* Trin.

Paspalum malacophyllum Trin. *Gram. Icon.* 3: pl. 271. 1831. "Figura ad specimen Brasilianum." The type, in the Trinius Herbarium, collected at Cuyabá, by Langsdorff, is a large plant with softly pubescent foliage.

Anachyris paspaloides Nees, *Journ. Bot. Kew Misc.* 2: 103. 1850. "Gardner hrbr. nr. 4031. Brasilia." The type specimen, in the Lindley Herbarium at Cambridge, bears the name in Nees's script (the generic name spelled *Anachyrium*). Duplicates are in the Kew, Berlin, Delessert, Vienna, and United States National herbaria. These plants are scarcely as robust as the type of *P. malacophyllum*, and have subglabrous sheaths, the lower blades tapering to a narrow base, the upper rounded at base. Steudel⁷⁴ gives the generic name "*Anachyrium*," as found in Nees's writing.

Wirtgenia paspaloides Nees; Doell in *Mart. Fl. Bras.* 2²: 40, 1877, as synonym of *Paspalum malacophyllum* Trin.

Paspalum malacophyllum β *glabrescens* Doell in *Mart. Fl. Bras.* 2²: 41. 1877. The specimens cited by Doell under *P. malacophyllum* are not differentiated into

⁷¹ In Prain, *Fl. Trop. Afr.* 9: 575. 1919.

⁷² *Mart. Fl. Bras.* 2²: 40. 1877.

⁷³ *Gen. Pl.* 3: 1097. 1883.

⁷⁴ *Syn. Pl. Glum.* 1: 33. 1854.

varieties. In the Brussels Herbarium Regnell's no. III. 1340 in 1867 bears this varietal name in Doell's script. The sheaths and blades are nearly glabrous except in the throat.

Paspalum malacophyllum γ *petiolatum* Doell in Mart. Fl. Bras. 2²: 41. 1877. In the Brussels Herbarium Burchell 8857 is named var. *petiolatum* in Doell's script. (The Burchell number cited under the species as a whole is 8858. That number was not found.) The blades taper to the base, as in *Gardner* 4031.

Paspalum malacophyllum δ *ciliatum* Doell in Mart. Fl. Bras. 2²: 41. 1877. In the DeCandolle Herbarium *Gardner* 2347 is named var. *ciliatum* in Doell's script. A duplicate is in the United States National Herbarium. The plants are more slender than *Gardner* 4031, but are much like that, the sheaths scarcely more ciliate.

Anachyris setaria Fourn. Mex. Pl. 2: 2. 1886. "San Luis de Potosí (VIRL. n. 1327)." The type, in the Fournier Herbarium in Paris, bearing the name in Fournier's script, consists of two culms with overmature panicles. Mounted on the sheet with these is a plant of *Paspalum conjugatum* Berg., apparently sterile but with young racemes inclosed in the sheaths. This plant must be the basis for Fournier's description "e rhizomate erumpentibus."

DESCRIPTION

An olivaceous or glaucous-purplish leafy perennial in large clumps from short scaly rhizomes; culms 0.7 to 2 meters tall, erect to leaning, terete, glabrous, at first simple, later bearing leafy flowering branches similar to the main culm; nodes glabrous; sheaths from rather densely papillose-pilose toward the summit to nearly glabrous except on the margin at the summit; ligule rather firm, about 2 mm. long, commonly forming a truncate summit to the sheath and uniting with the thin pilose margin, a conspicuous tuft of long, stiff hairs just back of the ligule; blades flat, or the margins revolute, spreading to drooping, 12 to 35 cm. long, 8 to 35 mm. wide, the lower and middle ones tapering to a narrow base, this often elongate in the lower blades, the upper rounded or cordate, from rather densely softly pubescent on both surfaces, the pubescence coarser and longer toward the base and sparsely stiffly ciliate on the scabrous margin, to glabrous on both surfaces except at the base, commonly appressed-puberulent beneath and glabrous or nearly so on the upper surface except at base, the midnerve prominent beneath; panicles nodding, mostly 10 to 25 cm. long, of 10 to 45 pale to purple, ascending to arcuate or reflexed racemes, 2 to 10 cm. long, approximate or fascicled on a strongly angled scabrous axis; rachis 1 to 1.7 mm. wide, narrowly winged, long-pilose at the base and often sparsely long-ciliate on the scabrous margin; spikelets in pairs, crowded, 1.8 to 2 mm. long, about 1 mm. wide, oblong-elliptic, concavo-convex, pale to dark purplish brown, glabrous; glume wanting, the sterile lemma as long as the fruit but slightly narrower, 5-nerved, the middle internerves thin in texture and deeply sunken; fertile lemma papillose-striate, with 7 prominent longitudinal ridges (5 showing from the back), the concave palea of like texture.

Millspaugh and Chase in *Plantae Yucatanæ*⁷⁵ and Nash⁷⁶ referred the Yucatan specimen to *P. elongatum* Griseb., a related species of South America.



FIGURE 137.—*P. malacophyllum*.
From Schott 593

⁷⁵ Field Mus. Bot. 3: 27. 1903.

⁷⁶ N. Amer. Fl. 17: 171. 1912.

DISTRIBUTION

Upland savannas, open slopes, and cliffs, up to 1,400 meters altitude, Mexico to Bolivia and Argentina.

YUCATÁN: Merida, *Schott* 593 (Field Mus.).

SAN LUIS POTOSÍ: *Virlet* 1327 (Paris Herb.).

BRAZIL: Piauí, *Gardner* 2347. Serra Mantiqueira, *Chase* 8695½. Serra do Cipó, *Chase* 9258. Oliveira, *Chase* 8892. Lavras, *Chase* 8769, 8791. Caldas, *Regnell* III. 1340. Goyaz, *Gardner* 4031, 4043. São João, *Holway* 1725. Jundiáhy, *Holway* 1645, 1646.

PARAGUAY: Between Río Apa and Río Aguidaban, *Fiebrig* 5180. Puerto Casado, *Rojas* 2788.

BOLIVIA: Samaipata, *Herzog* 1756, 1836. Hacienda Casana, *Buchtien* 7110.

ARGENTINA: Bonpland, *Ekman* 568. Dept. San Martín, *Stuckert* (*Kneucker Gram.*) 665. Santiago del Estero, *Lillo* 6240; *Venturi* 5711. Dept. Andalgalá, *Jørgensen* 1353. Prov. Catamarca, *Venturi* 7227. Prov. Salta, *Venturi* 3727. Prov. Tucuman, *Venturi* 1782.

Gardneriana.—Rigid perennials; spikelets with both glumes suppressed or minute; fruit strongly indurate-papillose. Only one of the four species known from North America.

136. *Paspalum gardnerianum* Nees

Paspalum gardnerianum Nees, Journ. Bot. Kew Misc. 2: 103. 1850. "Gardner hrbr. 3503 et 3510. Brasilia." The type, no. 3503, bearing the name, in Nees' script, is in the herbarium at Cambridge. Gardner's 3510 was examined in the Berlin Herbarium. In these plants the blades are nearly glabrous.



FIGURE 138.—*P. gardnerianum*.
From type collection

Paspalum gardnerianum var. *oligostachyum* Doell in Mart. Fl. Bras. 2²: 42. 1877. "Lagoa Santa provinciae Minarum * * * (Warming)." The type has not been examined. The only description is "Spicis 1-2." In *Chase* 9030, collected at Lagoa Santa, the inflorescence consists of 1 or 2 racemes. Culms bearing but 1 or 2 racemes are not infrequently found in clumps with culms bearing 3 to several racemes.

Paspalum gardnerianum var. *vestitum* Kuhlmann. Comm. Linhas Telegr. Matto Grosso 67: 49. 1922. Collected by "Tenente Boanerges de Sousa em campos Novos de Serra do Norte, M. Grosso (n. 6947)." The type has not been examined. The variety is differentiated from the species by the long tubercle-based hairs on the sheaths and blades. Nees and Doell both describe the blades of this species as glabrous, but they are rarely wholly glabrous, being mostly puberulent to pilose. In *Kuhlmann* 1664 and *Glaziou* 22601, and in some of the plants of *Glaziou* 22602, the pubescence is exceptionally long.

DESCRIPTION

A slender stiffly erect perennial, mostly in small tufts with a hard, slightly enlarged, densely woolly base; culms simple or occasionally bearing an erect branch from a lower node, 50 to 110 cm. tall, terete, glabrous; nodes glabrous or the lower appressed-pubescent; leaves olivaceous, often drying reddish brown,

numerous, the sheaths mostly overlapping, the lower appressed-pubescent, at least toward the base, to densely papillose-pilose, the upper from glabrous to sparsely papillose-pilose, commonly pubescent at least along the margin toward the summit, minutely auricled; ligule minute or nearly obsolete; blades flat or drying involute, firm, ascending to spreading, 5 to 25 cm. long, 3 to 7 mm. wide, from glabrous on both surfaces to puberulent or papillose-pilose, mostly puberulent on the upper surface, and with a few long hairs at the base, the midnerve and margins thick, pale; racemes 1 to 9, commonly 3 to 5, erect to arched-spreading, the lower 2.5 to 8 cm. long, rather remote on a slender axis; rachis about 0.9 mm. wide, densely pilose at the very base, the hairs not conspicuously long; spikelets, in pairs, crowded, the short pedicels bearing several stiff golden hairs longer than the spikelets, and forming an involucre-like tuft below the sterile lemma, the spikelets 1.6 to 1.9 mm. long, about 0.9 mm. wide, very turgidly plano-convex; glume wanting, the sterile lemma yellowish brown, 2 to 3 nerved, the midnerve commonly suppressed, sparsely pubescent or glabrous; fruit chestnut-brown, strongly papillose-striate, the margins of the lemma pale and smooth.

DISTRIBUTION

Savannas, campos, and open slopes, mostly in rather moist, sandy or stony ground, up to 1,300 meters altitude, Panama to Argentina.

PANAMA: Chorrera, *Hitchcock* 8169.

VENEZUELA: Nagua Nagua, *Warming* 1086 B.

BRITISH GUIANA: Rupununi Savanna, *Melville* 163.

BRAZIL: Parafuso, *Chase* 7999. Serra do Cipó, *Chase* 9127, 9183. Lagoa Santa, *Chase* 9015, 9030, 9049. Bello Horizonte, *Chase* 8964. Lavras, *Chase* 8816. Between Rio dos Couros and Rio Picatao, *Glaziov* 22602. Between Rio Bananal and Rio Torto, *Glaziov* 22601. Est. Goyaz, *Gardner* 3507, 4047; *Glaziov* 22466a, 22586, 22595, 22600. Serra do Tombador, *Kuhlmann* 1663. Between Diamantino and the beginning of Loho Linha Telegr., *Kuhlmann* 1664. São Simão, *Löfgren* 1516. Est. São Paulo, *Gerdes*. "S. Paulo-Minas Geraes," *Wacket* in 1902.

PARAGUAY: Rio Apa, *Hassler* 11904. Sierra de Amambay, *Hassler* 10090.

ARGENTINA: Itacuararé, *Parodi* 4701.

UNGROUPED SPECIES

The remaining species have no close allies.

137. *Paspalum pulchellum* Kunth

Reimaria elegans Humb. & Bonpl.; Flüge, Monogr. Pasp. 216. 1810. Not *Paspalum elegans* Flüge op. cit. 183. "Cumana. Humboldt et Bonpland." A specimen in the Willdenow Herbarium labeled "*Paspalum tristachyon*, *Reimaria elegans*. Habitat in Cumana" and with a slip marked "Humboldt," is probably the type.⁷⁷ The culms are without bases, the blades involute and appressed-pubescent, the racemes 2 and 3, the spikelets 1.9 mm. long.

Paspalum pulchellum Kunth, Mém. Mus. Hist. Nat. 2: 68. 1815. Based on *Reimaria elegans* Humb. & Bonpl. as published by Flüge. This name was again published as new the following year,⁷⁸ "*Reimaria elegans* Flüge" being cited, but the locality given as "ripa fluminis Orinoci inter Atures et Raudal de Javariveni." There are two specimens of this collection in the Paris Herbarium, both from the Bonpland Herbarium. The racemes are 2 and 4 in one specimen

⁷⁷ See page 1.

⁷⁸ H. B. K. Nov. Gen. & Sp. 1: 90. pl. 26. 1816.

and 2 and 3 in the other. Another, marked "Orinoco ex coll. Humboldt," in the Berlin Herbarium, has 3 racemes.

Paspalum tristachyum Willd.; Steud. Nom. Bot. ed. 2. 2: 273, 1841, as synonym of *P. pulchellum*. Not *P. tristachyon* Lam. 1791, nor *P. tristachyum* LeConte 1820. "Willd. hrb." See above, under *Reimaria elegans*.

Paspalum arenicolum C. Muell. Bot. Zeit. 19: 325. 1861. "Surinam, in arenosis prope Saron: Kegel Majo 1846 legit." The type, bearing the name in Mueller's script, in the Berlin Herbarium, is an overmature plant, most of the spikelets fallen. It is Kegel's no. 1266.

DESCRIPTION

A slender erect perennial, in dense tufts of few flowering culms and numerous leafy sterile shoots, the basal foliage mostly 10 to 25 cm. high, the culms nearly naked above; culms simple, 25 to 75 cm. tall, compressed, glabrous; nodes glabrous to appressed-pubescent; lower sheaths and those of the sterile shoots

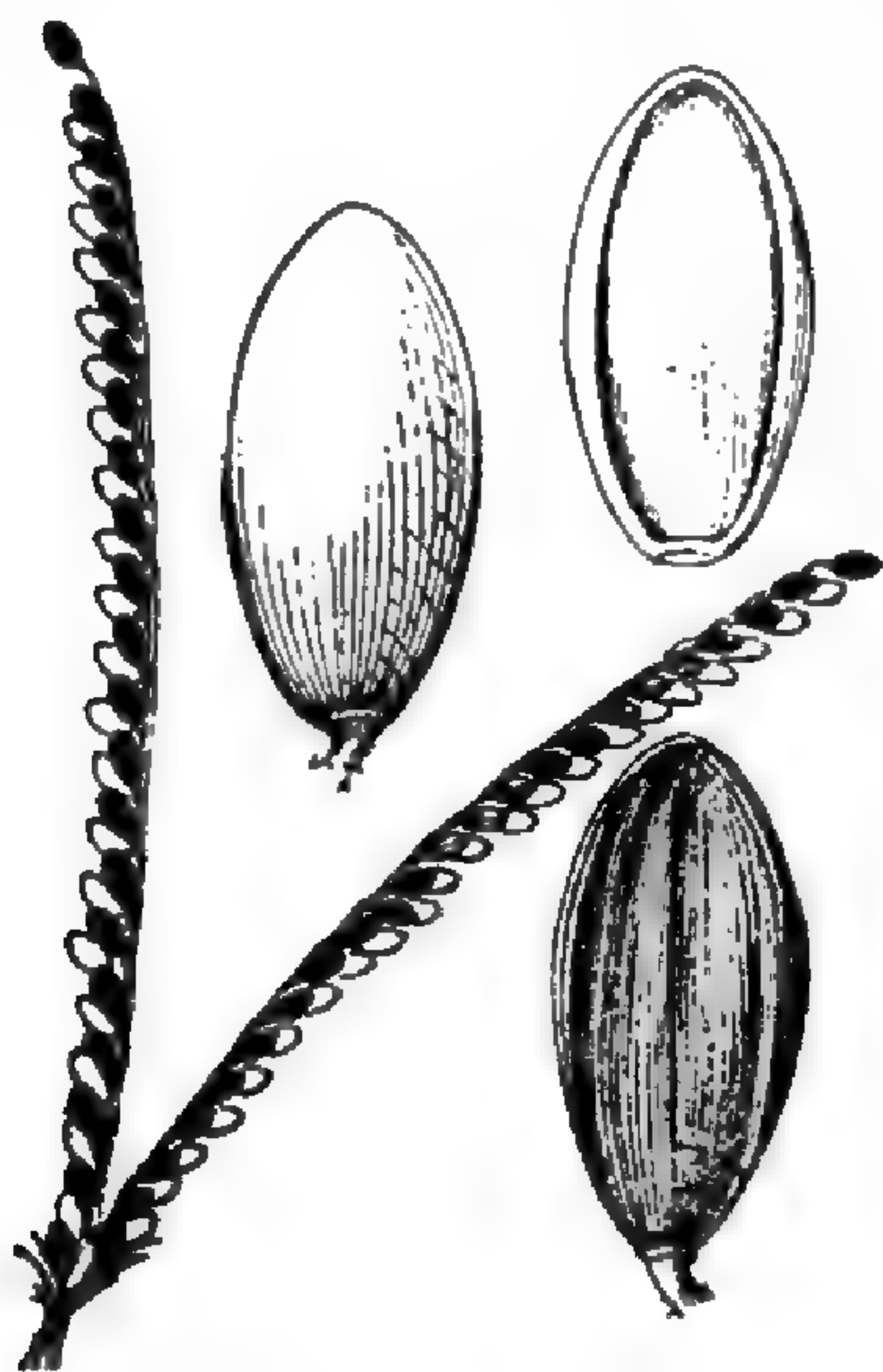


FIGURE 139.—*P. pulchellum*. From Hitchcock 10066

short, much overlapping, densely pilose to glabrous except along the margin, the upper longer but much shorter than the elongate internodes, bladeless, sparsely pilose to glabrous, usually ciliate on the margin; ligule minute, pale, obscured in the long hairs at the base of the blade; blades flat in moist situations or in wet weather, becoming involute, erect to spreading, often loosely curled, 5 to 25 cm. long, rarely longer, 1.5 to 4 mm. wide, from sparsely to densely papillose-pilose; racemes 2 or 3, commonly 2, rarely 4, suberect to widely spreading, 2 to 9 cm. long, approximate or the common axis 0.5 to 2 cm. long, narrowly winged toward the summit and extending into minute auricles at the base of the upper raceme; rachis about 0.8 mm. wide with a dense tuft of pale hairs at base, the margins thin; spikelets solitary, not crowded, 1.7 to 2 mm. long, about 1 mm. wide, strongly plano-convex, glabrous; glume wanting; sterile lemma barely equaling the fruit, 3-nerved, commonly dark purple; fruit smooth and shining, pale or somewhat leaden-purple toward maturity.

The racemes of this species, showing the alternate dark faces and pale backs of the spikelets, are unlike those of any other species of the genus.

DISTRIBUTION

Sandy, mostly moist savannas and pinelands, at low altitudes, Guatemala, Cuba, Dominican Republic, Trinidad, and south to Brazil.

GUATEMALA: Cristina, Blake 7612, 7666.

CUBA: Guane, Léon & Roca 6936. Herradura, Baker & Dimmock 4813; Ekman in Amer. Gr. Nat. Herb. 984; Hitchcock 469. Hanábana, Wright 171. San Marcos, Léon 9185. Placetas del Sur, Léon & Roca 8156. Nagua, Léon 11344. Isle of Pines, Britton & Wilson 14282; Ekman 11715. Without locality, Wright 3439.

DOMINICAN REPUBLIC: Matas, Eggers 2439.

TRINIDAD: Comuto Station, Hitchcock 10066. Arouca, Hitchcock 10338.

VENEZUELA: Cumana, Humboldt & Bonpland (Berlin Herb.).

BRITISH GUIANA: Lama Stop-off, Hitchcock 16974; Jenman 4532. Lama Savanna, Jenman 6014. Rupununi Savanna, Melville 144.

DUTCH GUIANA: "Surinam," *Hostmann* 1318, 1321.

FRENCH GUIANA: Without locality, *Leprieur* 77.

BRAZIL: Marajó Island, *Goeldi* 181, 194, 195. *Parafuso*, *Chase* 7981, 7982.

138. *Paspalum bifidum* (Bertol.) Nash

Panicum floridanum Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 248. 1834. Not *Paspalum floridanum* Michx. 1803. "Florid. Alabam." A specimen so named in the Trinius Herbarium is labelled "Georgia." Another in the Berlin Herbarium, which appears to be part of the same collection, gives Beyrich as collector. No specimen from Florida or Alabama so named was found in the Trinius Herbarium. The description leaves no doubt of the identity of the species.

Panicum bifidum Bertol. Mém. Acad. Sci. Bologna 2: 598. pl. 41. f. 2. e-h. 1850. No locality is cited, but the species is described in a paper on plants of Alabama. Although the type has not been located, the detailed description and the illustration identify the species.

Panicum alabamense Trin.; Steud. Syn. Pl. Glum. 1: 64. 1854. "Lincolnton. Am. sptr." Steudel explains that neither in Trinius' printed papers nor his manuscripts had he found this name. It was on a ticket in the herbarium of M. A. Curtis. Lincolnton is in the uplands of western North Carolina. The species is not known from North Carolina and it is especially unlikely that it was found in the uplands. Curtis probably collected it in Alabama, but may have sent it from his home at Lincolnton. In the Trinius Herbarium there is a specimen marked "*Panicum alabamense* teste Trin." Steudel's specimen from Curtis has not been located.

Paspalum racemosum Nutt.; Chapm. Fl. South. U. S. 571. 1860. "(*Panicum alabamense* Trin.) * * * Florida to North Carolina and westward." Chapman presumably took the name from a specimen so named by Nuttall, though such a specimen has not been located. Doctor Hale, of Tulane University, sent out specimens of *P. bifidum* named "*Paspalum racemosum* Nutt.," one of them being now in the United States National Herbarium. Chapman may have taken the name from one of these. In the National Herbarium is a specimen from Chapman collected by him in eastern Florida and named in his script "*P. racemosum* S. Fl."

Paspalum interruptum Wood, Class-book 783. 1861. "La. and Tex. (Hale). (*P. racemosum* Nutt. nec Jacq.)" *Paspalum racemosum* Nutt. is the same as *Eriochloa sericea* Munro. Wood's description applies not to that but to *P. bifidum*. One of Hale's collections sent out as *Paspalum racemosum* Nutt. was doubtless the plant described, the name being confused with *P. racemosum*. Wood seems not to have seen Chapman's Flora, published the preceding year.

Paspalum bifidum Nash, Bull. Torrey Club 24: 192. 1897. Based on *Panicum bifidum* A. Bertol.

Beal⁷⁹ describes this species under the name *P. racemosum* Lam.

DESCRIPTION

A slender erect perennial forming small colonies from numerous short rhizomes, the overlapping scales densely pubescent; culms simple, 50 to 120 cm. tall, compressed, glabrous; nodes glabrous or minutely pubescent; leaves somewhat aggregate toward the base, often glaucous, the sheaths narrow, the lower commonly free from the culm, from villous to nearly glabrous; ligule about

⁷⁹ Grasses N. Amer. 2: 87. 1896.

2 mm. long; blades flat, ascending, 10 to 50 cm. long, 3 to 14 mm. wide (the upper commonly obsolete), tapering to a base as narrow as the summit of the sheath, the junction obscure, from conspicuously villous on both surfaces to glabrous except on the upper surface toward the base, the margin scabrous; racemes 2 to 6, rarely to 8, commonly 3 or 4, at first erect, spreading toward maturity, 4 to 16 cm. long, distant on a slender flat axis; rachis very slender, subflexuous, with copious long hairs at the base; spikelets in pairs, distant to irregularly approximate on slender stiff, angled pedicels, elliptic-obovate, turgidly biconvex, 3.3 to 4 mm. long, 2.2 to 2.5 mm. wide, glabrous, olivaceous to russet-brown and commonly blotched with purple; first glume developed into a minute thin scale or wanting in the same raceme (rarely wholly wanting in an entire

inflorescence); second glume shorter than the fruit, strongly 7-nerved; sterile lemma barely equaling the fruit or slightly shorter, 5-nerved; fruit strongly indurate, stramineous, very obscurely papillose-striate.

This species, with its irregular racemes and biconvex spikelets with 5 to 7 nerved second glume and sterile lemma, shows affinity to *Panicum*. The first glume is so inconstant a differentiating character between *Panicum* and *Paspalum* as to have little value. *Paspalum bifidum* is not closely related to any known species in either genus.

DISTRIBUTION

Sandy pine and oak woods, occasionally in hammocks, nowhere common, on the Coastal Plain from South Carolina to Texas.

SOUTH CAROLINA: Aiken, *Ravenel* in 1866. Orangeburg, *Hitchcock* 9228. GEORGIA: Woodbury, *Harper* 1249. Sumter County, *Harper* 632.

FLORIDA: Pensacola, *Combs* 533. Galt City, *Combs* 481. De Funiak Springs, *Combs* 472. Chipley, *Combs* 558, 581, 593. River Junction, *Nash* 2579. Madison, *Combs* 285. Jacksonville, *Curtiss* 5080, 5590. Duval County, *Curtiss* 3572. Gainesville,



FIGURE 140.—*P. bifidum*. From *Curtiss* 5590

Chase 4270. Old Town, *Combs* 866. Fannin, *Combs* 867. Crystal, *Combs* 1001. Grasmere, *Baker* 17; *Combs & Baker* 1040, 1059. Clarcona, *Meislahn* 64. Orange City, *Hood* 81. Tampa, *Garber* in 1877. Fort Myers, *Hitchcock* 9235. Without locality, *Chapman*.

ALABAMA: Auburn, *Earle & Baker* in 1897. Wilcox County, *Buckley* in 1840. Mobile, *Mohr* in 1888.

MISSISSIPPI: Starkville, *Tracy* in 1890.

LOUISIANA: Alexandria, *Hale* in 1840.

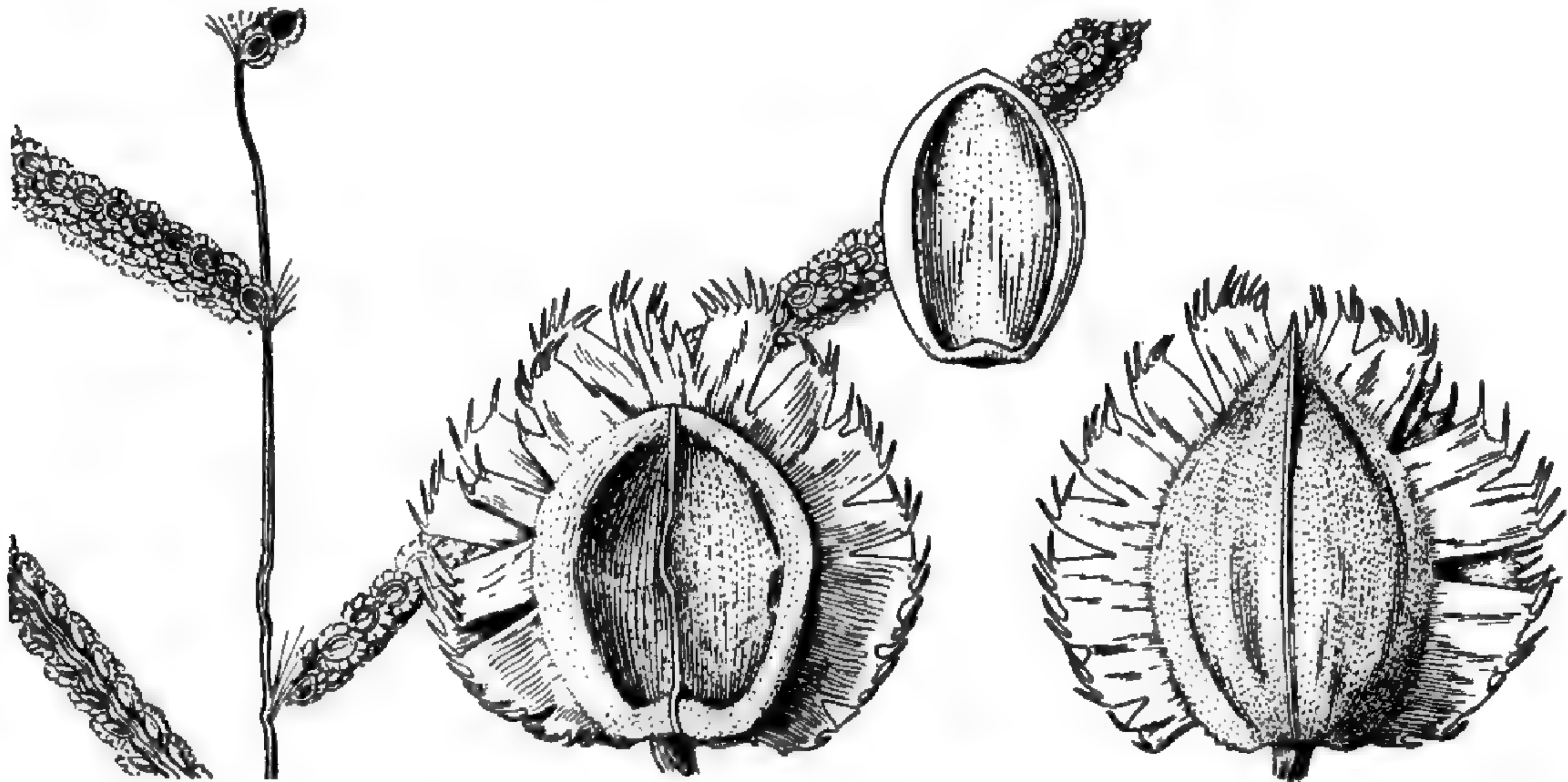
TEXAS: Dallas, *Reverchon* 1066 and in 1877. Waller County, *Thurrow* in 1898.

139. *Paspalum fimbriatum* H. B. K.

Paspalum fimbriatum H. B. K. Nov. Gen. & Sp. 1: 93. pl. 28. 1816. "Prope Ibague et in devexis montis Quelamanae (Regno Novogranatensi)," Colombia. In the Paris Herbarium is a specimen with the name and "Novo Granatensis, Rio Magd." in Bonpland's script and a little drawing of the spikelet on a Bonpland label. This is doubtless the type. The plant is 20 cm. tall.

DESCRIPTION

An erect or suberect annual, branching at the base, often finally from the middle nodes; culms 25 to 100 cm. tall, glabrous; nodes glabrous to appressed-pubescent; sheaths much overlapping at base, the upper slightly shorter than the internodes, compressed, conspicuously ciliate, otherwise glabrous or sometimes sparsely pilose; ligule thin-membranaceous, brown, lacerate, 1.5 to 2 mm. long; blades flat, thin, ascending, 5 to 30 cm., rarely as much as 40 cm., long, commonly 10 to 20 cm. long, 5 to 12 mm. wide (the upper reduced), narrowed to a rounded base, ciliate like the sheaths, the cilia very short or obsolete toward the apex; panicles short-exserted, erect, the slender narrowly winged axis 5 to 15 cm., commonly 8 to 10 cm., long, the margins minutely scabrous, the 3 to 8 ascending or spreading rather broad racemes 2.5 to 8 cm. long; rachis narrowly winged,

FIGURE 141.—*P. fimbriatum*. From Hitchcock 9773

about 1.5 mm. wide, scabrous on the margin, rarely sparsely ciliate, a tuft of long hairs at the very base; spikelets in pairs, 2.2 to 2.3 mm. long, 1.5 to 2 mm. wide, with a broad, firm, notched wing, the spikelet with the wing being about 3 mm. long and as wide or wider, compressed, pale or sometimes blotched with purple; glume and sterile lemma fragile, minutely and sparsely papillose under a lens, the glume slightly larger, apiculate, 3-nerved, the marginal nerves strong, bearing a stiff, notched wing 0.5 to 1 mm. wide, stiffly ciliate on the rim, the cilia pointing toward the apex of the spikelet, the lemma slightly concave, 3-nerved, winged like the glume or more commonly only partly winged or wingless; fruit pale, 2 mm. long, 1.4 mm. wide, ovate, obscurely roughened.

Paspalum scutatum Nees of Brazil, with wingless shield-shaped spikelets, is the only known ally of this striking species.

DISTRIBUTION

Savannas, open and waste ground, mostly in somewhat moist places, Panama, the West Indies, and northern South America; introduced in Hawaiian Islands.

PANAMA: Canal Zone, *Standley* 28583.

BAHAMAS: Andros, *Small & Carter* 8926. New Providence, *Curtiss* 3.

- CUBA: Baraguá, *Hitchcock* 23352. Preston, *Hitchcock* 23402. San Germán, *Léon* 9764. Santiago de Cuba, *Ekman* 8000.
- JAMAICA: Montego Bay, *Hitchcock* 9691; *Maxon & Killip* 1669. Troy, *Harris* 12584; *Hitchcock* 9792. Ipswich, *Hitchcock* 9625; *Maxon & Killip* 1521, 1524. New Forest, *Hitchcock* 9840. Between Ewarton and Linstead, *Hitchcock* 9422. Between Ewarton and Moneague, *Hitchcock* 9439. Castleton, *Maxon* 768. Bog Walk, *Hitchcock* in 1890. Kingston, *Cockerell* in 1892. Constant Spring, *Amer. Gr. Nat. Herb.* 565. Hope Gardens, *Harris* 11847; *Maxon* 1642; *Ridley* 6. Gordon Town, *Hart* 567, 687. Ramble, *Hitchcock* 9483. Cinchona, *Harris* 11267. Bryaris Ridge, *Perkins* 1486. Port Antonio, *Fredholm* 3284. Buff Bay, *Hitchcock* 9773; *Maxon & Killip* 292; *Millspaugh* 944. Without locality, *Lloyd* 1033; *Parkhurst* 13.
- HAITI: Plaisance, *Leonard* 9406. Gonave Island, *Leonard* 3173, 3217, 3221. Port-au-Prince, *Cook, Scofield & Doyle* 53, 61; *Hitchcock* 19869, 22956; *Leonard* 2796, 2820. Pétionville, *Leonard* 4881. Fond Varettes, *Buch* 1217; *Leonard* 3837. Miragoane, *Ekman* H 7264.
- PORTO RICO: Mayaguez, *Britton* 2378; *Chase* 6296; *Holm* 91. Santa Rita, *Chase* 6537. Peñuelas, *Sintenis* 4766. Between Aibonito and Ponce, *Chase* 6329. Ponce, *Heller* 6219. Between Ponce and Coamo, *Underwood & Griggs* 576. Coamo Springs, *Chase* 6550. Bayamon, *Hioram* 358. Island of Vieques, *Chase* 6665; *Shafer* 2476.
- VIRGIN ISLANDS: St. Croix, *Hitchcock* 16333; *Ricksecker* 238; *Rose, Fitch & Russell* 3532; *Thompson* 2.
- LEEWARD ISLANDS: Antigua, *Hitchcock* 16386; *Rose, Fitch & Russell* 3409. Guadeloupe, *Hitchcock* 16410. Dominica, *Hitchcock* 16423; *Jones* in 1913.
- WINDWARD ISLANDS: Montserrat, *Shafer* 707. Martinique, *Duss* 1275; *Hitchcock* 16466; *Husnot* 71. Barbados, *Bot. Station Herb.* 200; *Freeman* 5022; *Hitchcock* 16522. St. Lucia, *Hitchcock* 16490; *Kemp* 52. Grenada, *Hitchcock* 17668.
- TRINIDAD: Port of Spain, *Hitchcock* 10011.
- COLOMBIA: Cúcuta, *Killip & Smith* 20965.
- VENEZUELA: Tovar, *Fendler* 1713. Duaca, *Pittier* 11207. Guama, *Pittier* 11164. Valencia, *Pittier* 9022. Caracas, *Bailey* 544; *Pittier* 6157. El Valle, *Pittier* 9708. Los Teques, *Pittier* 6093. Siquire Valley, *Pittier* 6000. Without locality, *Eggers* 13090.
- BRITISH GUIANA: Georgetown, *Hitchcock* 16836. Demerara, *Kortnight* in 1911.
- BRAZIL: Parahyba, *Pickel* 1719.
- HAWAIIAN ISLANDS: Honolulu, *Hitchcock* 13561, 13672.

140. *Paspalum saccharoides* Nees

Saccharum polystachyum Swartz, Prodr. Veg. Ind. Occ. 21. 1788. Not *Paspalum polystachyum* R. Br. 1810. "St. Christopher." The type, bearing the name in Swartz's script, was kindly lent from Stockholm. No locality other than "ind. occ." is written on the sheet. In his later work⁸⁰ "Masson" is given as the collector. This specimen, collected by Francis Masson, is in the Banks Herbarium in the British Museum. A fragment of a raceme was kindly deposited in the United States National Herbarium.

Paspalum saccharoides Nees in Trin. Gram. Icon. 1: pl. 107. 1828. Based on *Saccharum polystachyum* Swartz, but the description and plate probably drawn from Sieber's no. 137, "ex Ind. occ.," in Trinius's herbarium.

Panicum saccharoides Kunth, Rév. Gram. 2: 237. pl. 30. 1830. Based on *Saccharum polystachyum* Swartz, but the figure drawn from a specimen collected at Cumana, Venezuela.

⁸⁰ Swartz, Fl. Ind. Occ. 1: 127. 1797.

Moenchia speciosa Wender; Steud. Nom. Bot. ed. 2. 2: 153, 1841, as synonym of *Panicum saccharoides*.

Tricholaena saccharoides Griseb. Syst. Unt. Veg. Karaib. 117. 1857. Based on *Panicum saccharoides* Kunth.

Syllepis polystachya Fourn. in Hack. in Mart. Fl. Bras. 2³: 251, 1883, as synonym of *Imperata caudata*; Fourn. Mex. Pl. 2: 52. 1886. The name is based on *Saccharum polystachyum* Swartz, but misapplied to a species of *Imperata*. (See page 9.)

Paspalum polystachyum Kuntze, Rev. Gen. Pl. 2: 786. 1891. Not *P. polystachyum* R. Br. 1810. Based on *Saccharum polystachyum* Swartz.

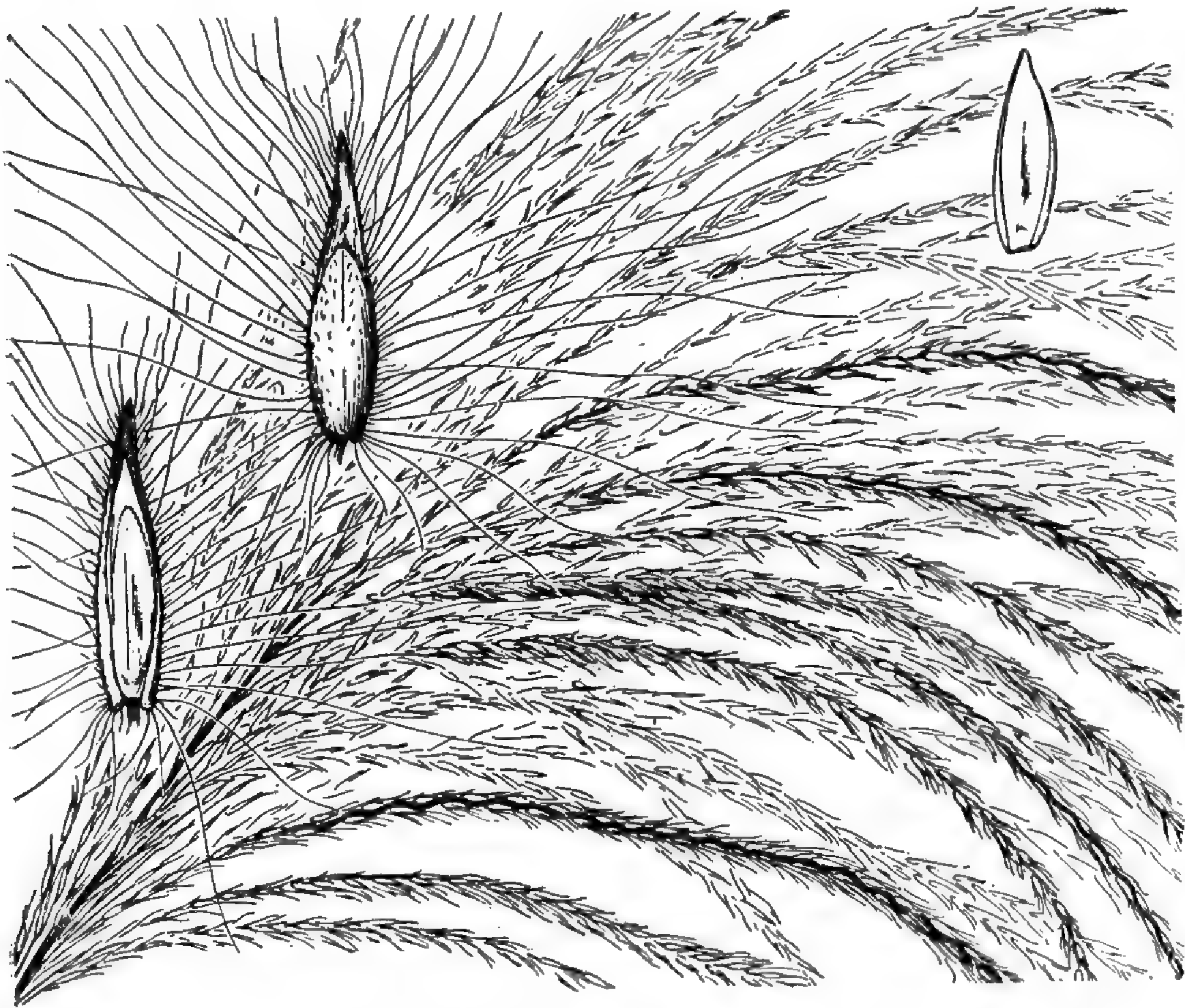


FIGURE 142.—*P. saccharoides*. From Hitchcock 7904

DESCRIPTION

A robust branching perennial growing in tough clumps; culms 1 to 2 meters long, ascending to suberect, often decumbent or creeping at base, with erect branches, subcompressed, glabrous; nodes glabrous, the lower commonly forming a narrow ridge; sheaths overlapping, sometimes sparsely papillose-pilose or papillose only, more commonly glabrous, densely silky-ciliate, at least toward the summit, or in age glabrescent; ligule a minute, firm, very obscure membrane, with a dense row of long hairs back of it; blades flat, often subinvolute in drying, spreading, firm, 15 to 30 cm. long, 8 to 15 mm. wide, tapering to a slender tip, finely papillose-pilose on the upper surface, glabrous beneath; panicle subflabellate, feathery, composed of 30 to 50 slender silky drooping racemes 15 to 30 cm. long, solitary or fascicled on a relatively short axis; rachis about 0.6 mm. wide, often naked from 5 to 20 mm. at the base, a tuft of silky hairs at the very base; spikelets solitary, not crowded, 2.5 to 3 mm. long, excluding the hairs, about 0.7 mm. wide, lanceolate, acuminate, subcordate at

base on slender flat pedicels, those toward the base of the raceme sometimes elongate; glume and sterile lemma thin in texture, 3-nerved, the midnerve obscure or suppressed, the glume sparsely pubescent on the back and bearing a fringe of pale silky hairs as much as 5 to 8 mm. long arising from papillae on the lateral nerves, interspersed with short hairs, the hairs widely spreading at maturity; sterile lemma shorter than the glume, glabrous; fruit about 1.9 mm. long, acute, the pale smooth lemma and palea but slightly indurate.

DISTRIBUTION

Open, brushy or jungly slopes, mostly in moist spots, up to 1,800 meters altitude, Costa Rica and the Lesser Antilles to Bolivia.

COSTA RICA: Port Limon, *Hitchcock* 8438. San Francisco Dos Ríos, *Pittier* 6907.

CENTRAL AMERICA: Without locality, *Oersted* 14008.

PANAMA: Canal Zone, *Hayes* 219; *Hitchcock* 7904, 8045; *Kenoyer* 112; *Pittier* 3745.

LEEWARD ISLANDS: Guadeloupe, *Duss* 3366. Dominica, *Imray* 311.

WINDWARD ISLANDS: Martinique, *Duss* 1317. Grenada, *Broadway* 62, 2919, and in 1905; *Smith* 192, 843.

TRINIDAD: Cedros, *Hitchcock* 10134. Without locality, *Broadway* in 1919.

TOBAGO: Adelphi, *Broadway* 3979. Center of island, *Hitchcock* 10278.

COLOMBIA: Santa Marta, *Smith* 161. Villavicencio, *Pennell* 1505. Libano, *Pennell* 3349. Dept. Cundimarca, *Ariste Joseph* 1021. Fredonia, *Toro* 184.

VENEZUELA: Carayaca, *Jahn* 304.

ECUADOR: Huigra, *Rose* 22645. Between Huigra and Naranjapata, *Hitchcock* 20652. Between Baños and Cashurco, *Hitchcock* 21761.

PERU: Chicoplaya, *Ruiz* (Berlin Herb.).

BOLIVIA: Coripata, *Hitchcock* 22686. Antahuacana, *Buchtien* 2513. Sarampiuni, *Buchtien* 65 in 1927.

DOUBTFUL SPECIES

In the following list are given the names assigned to species of *Paspalum* and credited to North America which have not been accounted for in the preceding pages and which can not definitely be excluded from *Paspalum* as here limited. The list includes several nomina nuda which are mentioned only because the names are given in the Index Kewensis and consequently have become a part of the literature upon the genus.

PASPALUM CILIATUM Rottb. Act. Lit. Univ. Hafn. 1: 285. 1778. Name only, in a list of plants of Surinam.

PASPALUM COMPRESSUM Raf. Fl. Ludov. 15. 1817. "Panic 1. Rob. p. 335." Robin⁸¹ gives a brief description of a species of *Paspalum* of the Louisiana prairies, which is 5 or 6 feet high, the seeds of which are eaten by birds. Neither this description nor Rafinesque's are sufficient to identify the species. *Paspalum boscianum* Flüge most nearly agrees with the description.

PASPALUM DECUMBENS Rottb. Act. Lit. Univ. Hafn. 1: 285. 1778. The name is given in Index Kewensis, but Rottboell merely mentions a decumbent paspalum in a sheep pasture in Surinam (Dutch Guiana).

PASPALUM DIFFUSUM Rottb. Act. Lit. Univ. Hafn. 1: 285. 1778. No description, only the statement that the seeds are eaten by birds in Surinam.

PASPALUM FUSCATUM Spreng.; Steud. Nom. Bot. ed. 2. 2: 257, 271, 1841, as synonym of *Panicum hybridum* Trin., name only, from Guadeloupe. Probably *Panicum*.

⁸¹ Flore Louisianaise 335. 1807.

PASPALUM GENICULATUM Raf. Fl. Ludov. 15. 1817. "Panic 2. Rob. p. 335." Neither Robin's description nor Rafinesque's is sufficient to identify the species.

PASPALUM MONONEURON Steud. Syn. Pl. Glum. 1: 24. 1854. "Oaxaca," Mexico. The type has not been located. The description does not apply to any species known to us.

PASPALUM RUDIMENTOSUM Steud. Syn. Pl. Glum. 1: 24. 1854. "Oaxaca," Mexico. The type has not been located. The description suggests a specimen of *P. affine* Steud., having blades smaller than usual and racemes with abortive spikelets at base.

PASPALUM SUPINUM Rich.; Hornem. Hort. Hafn. 1: 77. 1813. "Hab. ad Baltimore, in Amer. sept.," introduced in the Royal Botanic Garden in Copenhagen in 1807. The description suggests *P. supinum* Bosc, but that is not known from the region of Baltimore. Probably *P. pubescens*.

PASPALUM TRIGLUME Steud. Syn. Pl. Glum. 1: 27. 1854. "Oaxaca," Mexico. The type has not been located. From the description it seems probable that the plant does not belong in *Paspalum*, but is rather a species of *Panicum*.

EXCLUDED SPECIES

Besides the valid species and the names accounted for in synonymy within the genus *Paspalum* there are a great many names that, as *Paspalum* is limited, excluding *Syntherisma* and *Axonopus*, are referable to these and other genera. Names based on North American collections or applying to species known from North America are given in the following list. Names followed by generic names only have not been identified specifically.

Paspalum adpressum Pers. (Error in Ind. Kew. for *Digitaria appressa* Pers.) = *Panicum geminatum* Forsk.

Paspalum appendiculatum Presl = *Axonopus appendiculatus* (Presl) Hitchc. & Chase.

Paspalum appressum Lam. (not *P. appressum* Forsk.) = *Panicum geminatum* Forsk.

Paspalum aristatum Moench = *Beckmannia erucaeformis* (L.) Host.

Paspalum aureum (Beauv.) H. B. K. = *Axonopus aureus* Beauv. Misapplied to *Axonopus chrysoblepharis* (Lag.) Chase.

Paspalum brevifolium Flügge = *Syntherisma longiflora* (Retz.) Skeels.

Paspalum capillare Lam. = *Axonopus capillaris* (Lam.) Chase.

Paspalum carolinianum Poir. = *Syntherisma* sp.

Paspalum chinense Nees = *Syntherisma chinensis* (Nees) Hitchc.

Paspalum chrysoblephare (Lag.) Doell = *Axonopus chrysoblepharis* (Lag.) Chase.

Paspalum compressum (Swartz) Rasp. (not *P. compressum* Raf.) = *Axonopus compressus* (Swartz) Beauv.

Paspalum conjugatum var. *subcordatum* Griseb. = *Axonopus compressus* (Swartz) Beauv.

Paspalum cubense Spreng. = *Homalocenchrus monandrus* (Swartz) Kuntze.

Paspalum cynosuroides (L.) Brot. = *Spartina cynosuroides* (L.) Roth.

Paspalum dactylon (L.) Lam. = *Capriola dactylon* (L.) Kuntze.

Paspalum depressum Steud. = *Axonopus* sp.

Paspalum digitaria C. Muell. (not *P. digitaria* Poir.) = *Axonopus furcatus* (Flügge) Hitchc.

Paspalum digitatum (Swartz) Kunth = *Syntherisma digitata* (Swartz) Hitchc.

Paspalum effusum (L.) Rasp. = *Milium effusum* L.

Paspalum erucaeforme (L.) Spreng. = *Beckmannia erucaeformis* (L.) Host.

Paspalum filiforme (L.) Flügge. (not *P. filiforme* Swartz) = *Syntherisma filiformis* (L.) Nash.

- Paspalum filostachyum* Rich. = *Axonopus compressus* (Swartz) Beauv.
Paspalum fournierianum Ricker; Schell. in Schinz & Thell. (name only) = *Axonopus deludens* Chase.
Paspalum furcatum Flügge = *Axonopus furcatus* (Flügge) Hitchc.
Paspalum furcatum var. *filiforme* (Muhl.) Doell = *Syntherisma filiformis* (L.) Nash.
Paspalum furcatum var. *parviflorum* Doell. = *Axonopus compressus* (Swartz) Beauv.
Paspalum furcatum var. *villosum* Vasey = *Axonopus furcatus* (Flügge) Hitchc.
Paspalum glabrum Cassidy (not *P. glabrum* Poir.) = *Syntherisma* sp.
Paspalum guadaloupense Steud. = *Axonopus compressus* (Swartz) Beauv.
Paspalum humifusum (Pers.) Poir. = *Syntherisma ischaemum* (Schreb.) Nash.
Paspalum lanatum H. B. K. = *Leptocoryphium lanatum* (H. B. K.) Nees.
Paspalum laticulmum Spreng. = *Axonopus compressus* (Swartz) Beauv.
Paspalum longissimum var. *guadalupense* Steud.; Griseb. = *Axonopus compressus* (Swartz) Beauv. Erroneously cited as synonym of *P. conjugatum*.
Paspalum michauxianum var. *villosum* Vasey = *Axonopus furcatus* (Flügge) Hitchc.
Paspalum paspaloides villosum (Vasey) Scribn. & Ball = *Axonopus furcatus* (Flügge) Hitchc.
Paspalum pilosum Spreng.; Steud. (not *P. pilosum* Lam.) = *Thrasya thrasyoides* (Trin.) Chase.
Paspalum platycaulon Poir. = *Axonopus compressus* (Swartz) Beauv.
Paspalum platycaule Willd.; Steud. = *Axonopus* sp.
Paspalum platyphyllum Griseb. (not *P. platyphyllum* Schult.) = **Brachiaria extensa**, nom. nov. The name *Brachiaria platyphylla* (Griseb.) Nash, based on *Panicum platyphyllum* Munro, which is based on *Paspalum platyphyllum* Griseb., used in the revision of *Brachiaria*⁸² is not valid, because of the earlier *Paspalum platyphyllum* Schult.
Paspalum punctatum (L.) Flügge = *Eriochloa punctata* (L.) Hamilt.
Paspalum purpusii Mez = *Axonopus purpusii* (Mez) Chase.
Paspalum racemosum Nutt. (not *P. racemosum* Lam.) = *Eriochloa sericea* Munro.
Paspalum raunkiaerii Mez = *Axonopus compressus* (Swartz) Beauv.
Paspalum rosei Scribn. & Merr. = *Axonopus rosei* (Scribn. & Merr.) Chase.
Paspalum sanguinale (L.) Lam. = *Syntherisma sanguinalis* (L.) Dulac.
Paspalum sericeum Scheele = *Eriochloa sericea* Munro.
Paspalum serotinum (Walt.) Flügge = *Syntherisma serotina* Walt.
Paspalum strictum Brot. (not *P. strictum* Pers.) = *Spartina stricta* (Ait.) Roth.
Paspalum tenue Willd.; Steud. (not *P. tenue* Gaertn.) = *Axonopus compressus* (Swartz) Beauv.
Paspalum tristachyon Lam. = *Axonopus compressus* (Swartz) Beauv.
Paspalum uniflorum (Salzm.) Steud. = *Axonopus compressus* (Swartz) Beauv.
Paspalum velutinum (DC.) Kunth = *Syntherisma velutina* (DC.) Chase.
Paspalum villosum Willd.; Steud. (not *P. villosum* Thunb.) = *Syntherisma* sp.

⁸² Chase, The North American Species of *Brachiaria*. Contr. U. S. Nat. Herb. 22: 40. 1920.

LIST OF NEW SPECIES AND NEW NAMES

	Page
Paspalum adoperiens (Fourn.) Chase.....	102
<i>Dimorphostachys adoperiens</i> Fourn.	
Paspalum amphicarpum Ekman, sp. nov.....	161
Paspalum arsenii Chase, sp. nov.....	63
Paspalum dispar Chase, sp. nov.....	96
Paspalum distortum Chase, sp. nov.....	142
Paspalum erectum Chase, sp. nov.....	189
Paspalum hitchcockii Chase, sp. nov.....	160
Paspalum insulare Ekman, sp. nov.....	145
Paspalum jimenezii Chase, sp. nov.....	159
Paspalum leptachne Chase, sp. nov.....	220
Paspalum mutabile Chase, sp. nov.....	61
Paspalum nelsoni Chase, sp. nov.....	203
Paspalum nesiotetes Chase, sp. nov.....	117
Paspalum palmeri Chase, sp. nov.....	109
Paspalum plenum Chase, sp. nov.....	202
Paspalum saugettii Chase, sp. nov.....	147
Paspalum strigosum Doell.....	68
<i>Paspalum bicrurulum</i> Salzm; Doell 1877. Not <i>P. bicrurulum</i> Salzm; Steud. 1854.	
Paspalum tinctum Chase, sp. nov.....	62
Paspalum umbratile Chase, sp. nov.....	132
Paspalum yucatanum Chase, sp. nov.....	121
Brachiaria extensa Chase, nom. nov.....	240
<i>Paspalum platyphyllum</i> Griseb. Not <i>P. platyphyllum</i> Schult. (<i>Bra-</i> <i>chiaria platyphylla</i> (Griseb) Nash).	

INDEX TO NUMBERED SPECIMENS

The following list includes the numbered specimens of the more important collectors cited in the distribution of the species. Two or more species when here listed under one number were distributed under this number by the collector.

ABBON, BROTHER

161. Lividum.

ABBOTT, W. L.

68. Paniculatum.
70. Conjugatum.
71. Virgatum.
83. Conjugatum.
152. Notatum.
195. Paniculatum.
204. Conjugatum.
513. Paniculatum.
632. Plicatulum.
671. Densum.
689. Plicatulum.
830. Minus.
850. Minus.
850b. Multicaule.
1119. Paniculatum.
1172. Laxum.
2880a. Laxum.

ABRAHAM, A. A.

98. Multicaule.
346. Decumbens.

ABRAMS, LEROY

1762. Distichum.

ALEXANDER, C. P.

157. Distichum.

ALLART, A.

214. Trachycoleon.

ALLEMÃO, F.

1652. Conjugatum.

ALLEN, ENA A.

15. Plicatulum.
16. Lividum.

ALLISON, ANDREW

51. Floridanum.
147. Dilatatum.
258. Lentiferum.

ALSTON, A. H. G.

268. Coniugatum.

AMER. GR. NAT. HERB.⁸⁴

563. Vaginatulum.
564. Notatum.
565. Fimbriatum.
566. Filiforme.
567. Rupestre.
568. Caespitosum.
569. Caespitosum.
570. Molle.
571. Blodgettii.
572. Laxum.
573. Decumbens.
574. Multicaule.
575. Orbiculatum.
576. Virgatum.
577. Secans.
578. Millegrana.
579. Densum.
908. Pubiflorum.
914. Notatum.
934. Langei.
940. Paniculatum.
942. Bakeri.
943. Rocanum.
944. Alterniflorum.

⁸⁴ American grasses from the U. S. National Herbarium, Smithsonian Institution, distributed by the Systematic Agrostologist, U. S. Department of Agriculture.

AMER. GR. NAT. HERB.—Continued

- 945. Rottboellioides.
- 946. Filiforme.
- 947. Lindenianum.
- 948. Nanum.
- 949. Rupestre.
- 950. Saugetii.
- 954. Clavuliferum.
- 957. Reptatum.
- 958. Amphicarpum.
- 960. Conjugatum.
- 962. Dilatatum.
- 966. Laeve.
- 978. Wrightii.
- 984. Pulchellum.

ANDERSON, A. P.

- 1406. Boscianum.
- 1523. Dilatatum.
- 1524. Pubiflorum glabrum.
- 1539. Boscianum.
- 1540. Pubiflorum glabrum.

ANDERSSON, N. J.

- 8. Distichum.

ANECT, BROTHER

- 57. Dilatatum.

ANTHONY, H. E., AND TATE, G. H. H.

- 79. Racemosum.

ARECHAVALETA, JOSÉ

- 2 (in 1890). Pumilum.
- 77. Dilatatum.
- 79 (in 1874). Pumilum.
- 201. Distichum.

ARISTE JOSEPH, BROTHER

- A 458b. Prostratum.
- A 463a. Prostratum.
- A 550. Candidum.
- 1021. Saccharoides.
- 1066. Plenum.

ARSÈNE, BROTHER G.

- 58. Arsenei.
- 333. Distichum.
- 1411. Arsenei.
- 1601. Distichum.
- 1604. Crinitum.

ARSÈNE, BROTHER G.—Continued

- 2284. Crinitum.
- 2284a. Convexum.
- 2377. Tenellum.
- 2384. Arsenei.
- 2384b. Lividum.
- 2471. Humboldtianum.
- 2478. Convexum.
- 2644. Tenellum.
- 2644a. Convexum.
- 2693. Arsenei.
- 2805. Pubiflorum.
- 2813. Humboldtianum.
- 2917. Notatum.
- 3129. Prostratum.
- 3132. Acuminatum.
- 3176. Lividum.
- 3362. Distichum.
- 5268. Lividum.
- 5849. Humboldtianum.
- 6283. Notatum.
- 6301. Lividum.
- 6665. Humboldtianum.
- 8272. Tenellum.
- 8277. Lividum.
- 8324. Arsenei.
- 8535. Arsenei.
- 8684. Prostratum.
- 8831. Distichum.
- 10268. Paucispicatum.
- 10272. Lividum.
- 10348. Pubiflorum.
- 10349. Lividum.
- 11009. Laeve.
- 11013. Lentiferum.
- 11015. Lentiferum.
- 11015½. Longipilum.
- 11137. Floridanum.
- 11156. Floridanum.
- 11259. Floridanum.
- 11260. Pubescens.
- 11285. Ciliatifolium.
- 11327. Lentiferum.
- 11401½. Laeve.
- 11403. Urvillei.
- 11410. Dilatatum.
- 11512. Floridanum.
- 11710. Floridanum.
- 11777. Difforme.
- 12235. Dilatatum.
- 12245. Urvillei.
- 12251. Plicatulum.
- 12349. Urvillei.

ARSÈNE, BROTHER G.—Continued

12518. Floridanum.
 12538. Floridanum.
 12568. Lentiferum.
 12572. Floridanum.

BACKER, C. A.

- 23079b. Conjugatum.

BAILEY, L. H. AND E. Z.

56. Convexum.
 112. Stellatum.
 148. Trachycoleon.
 247. Notatum.
 263. Unispicatum.
 273. Convexum.
 358. Conjugatum.
 371. Conjugatum.
 447. Trachycoleon.
 544. Fimbriatum.
 950. Millegrana.
 972. Conjugatum pubescens.
 1162. Paniculatum.
 1163. Conjugatum pubescens.
 1165. Conjugatum pubescens.
 1181. Decumbens.
 1189. Paniculatum.
 1205. Pilosum.
 1218. Decumbens.
 1222. Pilosum.
 1228. Paniculatum.
 1314. Conjugatum.

BAIN, S. M.

175. Pubiflorum glabrum.
 183. Floridanum.

BAKER, C. F.

2. Notatum.
 33. Plicatulum.
 34. Plicatulum.
 90. Conjugatum.
 1699. Distichum.
 1836. Distichum.
 2012. Conjugatum.
 2056. Plicatulum.
 2587. Alterniflorum.
 2968. Notatum.
 3459. Lineare.
 3626. Arundinaceum.

BAKER, C. F., AND ABARCA

4185. Multicaule.

BAKER, C. F., AND DIMMOCK.

4813. Pulchellum.

BAKER, C. F., AND O'DONOVAN

4417. Saugetii.

BAKER, C. F., TRACY, S. M., AND
HASSELBRING, H.

3096. Lividum.
 3097. Notatum.

BAKER, C. F., AND WILSON, P.

385. Distichum.
 543. Conjugatum.
 595. Virgatum.
 596. Plicatulum.
 2303. Arundinaceum.

BAKER, C. F., AND ZARRAGOITIA

4545. Alterniflorum.

BAKER, C. H.

17. Bifidum.
 60. Ciliatifolium.
 248. Ciliatifolium.
 250. Debile.
 300. Floridanum glabratum.
 302. Laeve.
 303. Longipilum.
 320. Praecox.

BALL, C. R.

10. Circulare.
 12. Pubescens.
 12a. Ciliatifolium.
 16. Dilatatum.
 38. Floridanum.
 39. Boscianum.
 47. Pubescens.
 47a. Ciliatifolium.
 48. Circulare.
 48½. Laeve.
 68. Dilatatum.
 96. Dilatatum.
 103. Distichum.
 108. Pubiflorum glabrum.
 113. Pubescens.

BALL, C. R.—Continued

- 114. Dilatatum.
- 117. Circulare.
- 147. Pubiflorum glabrum.
- 148. Pubiflorum.
- 159. Repens.
- 165. Longipilum.
- 170. Pubescens.
- 171. Floridanum.
- 172. Circulare.
- 173. Urvillei.
- 179. Pubiflorum.
- 186. Floridanum.
- 187. Pubescens.
- 188. Lentiferum.
- 189. Circulare.
- 216. Boscianum.
- 221. Dissectum.
- 231. Plicatulum.
- 451. Urvillei.
- 496. Pubiflorum.
- 555. Ciliatifolium.
- 613. Plicatulum.
- 642. Circulare.
- 684. Boscianum.
- 688. Floridanum.
- 939. Pubiflorum.
- 941. Distichum.
- 1155. Stramineum.
- 1655. Stramineum.

BALL, C. R., AND PADDOCK, A. E.

- 47. Circulare.

BANG, MIGUEL

- 308. Paniculatum.
- 1312. Distichum.
- 1426a. Multicaule.
- 2590. Humboldtianum.

BARBADOS BOTANIC STATION
HERBARIUM⁸⁵

- 200. Fimbriatum.
- 269. Conjugatum.
- 277. Vaginatum.

BARRETT, O. W.

- 73. Paniculatum.

BARTLETT, H. H.

- 1503. Longipilum.
- 2826. Laeve.
- 2836. Longipilum.
- 2838. Pubescens.
- 3068. Floridanum glabratum.
- 7944. Conjugatum.

BASILE, BROTHER

- 34. Pubiflorum.
- 35. Pubiflorum.

BEBB, ROBERT

- 1093. Ciliatifolium.
- 1108. Ciliatifolium.
- 1234. Plicatulum.
- 1249. Plicatulum.
- 1431. Stramineum.
- 2673. Stramineum.

BECCARI, O.

- 3528. Vaginatum.

BERNOULLI AND CAIRO

- 938. Acuminatum.
- 964. Repens.

BERRO, M. B.

- 6733. Pumilum.

BILTMORE HERBARIUM

- 814a. Laeve.
- 815b. Setaceum.
- 815c part. Longepedunculatum.
- 3044a. Floridanum glabratum.
- 3044b. Floridanum.
- 3044b part. Difforme.
- 3048a. Lentiferum.
- 4302a. Ciliatifolium.
- 4307a. Dissetum.
- 5690. Dilatatum.
- 6075a. Lentiferum.
- 8338. Longipilum.

BIOLLEY, P.

- 2651. Pectinatum.
- 3108. Orbiculatum.
- 7470. Conjugatum.

⁸⁵ See also Dash, J. S.

BITTING, A. W.

- 811. Plicatulum.
- 831. Ciliatifolium.
- 833. Supinum.
- 895. Plicatulum.
- 1007. Ciliatifolium.
- 1195. Plicatulum.

BLACK, R. A.

- 33. Distichum.

BLAKE, S. F.

- 7445. Pectinatum.
- 7612. Pulchellum.
- 7625. Virgatum.
- 7627. Paniculatum.
- 7666. Pulchellum.
- 7674. Conjugatum.
- 7702. Paniculatum.
- 7706. Conjugatum.
- 7744. Minus.
- 7746. Plicatulum.
- 7799. Caespitosum.
- 7812. Decumbens.
- 7815. Caespitosum.
- 7833. Vaginatum.
- 7834. Decumbens.

BLANCHET, J. S.

- 230. Distichum.

BOCK, F. A., AND CHASE, V. H.

- 18. Pubescens.
- 18½. Circulare.
- 28. Circulare.
- 36. Circulare.
- 40. Pubescens.
- 50. Circulare.
- 51. Pubescens.
- 53. Circulare.
- 54. Pubescens.
- 57. Circulare.
- 58. Pubescens.
- 59. Pubescens.
- 62. Circulare.
- 67. Circulare.
- 68. Pubescens.
- 69. Circulare.
- 70. Circulare.
- 72. Circulare.
- 73. Pubescens.
- 74. Circulare.
- 77. Circulare.

BOCK, F. A., AND CHASE, V. H.—Con.

- 78. Circulare.
- 79. Pubescens.
- 100. Pubescens.
- 101. Circulare.
- 103. Circulare.
- 104. Pubescens.
- 106. Circulare.
- 142. Circulare.
- 143. Pubescens.
- 145. Pubiflorum glabrum.
- 147. Pubiflorum glabrum.
- 150. Pubiflorum glabrum.
- 151. Pubescens.
- 162. Circulare.
- 163. Pubescens.
- 165. Circulare.
- 168. Circulare.
- 174. Circulare.
- 177. Pubescens.
- 178. Circulare.
- 188. Circulare.
- 191. Pubescens.
- 193. Pubescens.
- 194. Circulare.
- 198. Pubescens.
- 203. Pubescens.
- 206. Stramineum.

BOGUSCH, E. R.

- 498. Debile.
- 500. Debile.
- 1487. Distichum.

BOIVIN, L. H.

- 1498. Nutans.

BOLDINGH, I.

- 4836. Secans.

BOTTERI, M.

- 110 (in 1856). Conjugatum pubescens.
- 110. Lividum.
- 566. Lividum.
- 659. Botterii.
- 1267. Plenum.
- 1286. Lividum.

BOURGEAU, E.

- 532. Distichum.
- 1150. Tenellum.
- 1658. Variabile.
- 1659. Conjugatum.

BOURGEAU, E.—Continued

2298. Minus.
 2544. Lividum.
 2598. Variabile.
 2633. Plicatulum.
 2641. Humboldtianum.
 2642. Paniculatum.
 2745. Plicatulum.
 2749. Notatum.
 2752. Conjugatum pubescens.
 2843. Plicatulum.
 2975. Plenum.

BOURNE, F. S. A.

3027. Dilatatum.

BRACE, L. J. K.

4805. Molle.
 5258. Caespitosum.

BRADE, A. C.

6179. Nutans.

BRANDEGEE, T. S.

2. Vaginatum.
 40. Squamulatum.

BRITTON, N. L.

465. Distortum.
 1475. Filiforme.
 1902. Laxum.
 2175. Caespitosum.
 2361. Millegrana.
 2368. Paniculatum.
 2378. Fimbriatum.

BRITTON, N. L., AND BRACE, L. J. K.

340. Vaginatum.
 404. Laxum.
 513. Distichum.
 598. Secans.

BRITTON, N. L. AND E. G.

7225. Decumbens.
 9068. Decumbens.

BRITTON, N. L. AND E. G., AND
BROWN, S.

6630. Laxum.
 6950. Propinquum.
 7038. Laxum.

BRITTON, N. L. AND E. G., AND
COWELL, J. F.

2103. Paniculatum.

BRITTON, N. L. AND E. G., AND
WILSON, P.

14939. Bakeri.
 15015. Plicatulum.
 15114. Lineare.
 15354. Plicatulum.
 15359. Blodgettii.
 15631. Plicatulum.

BRITTON, N. L., AND BROWN, S.

5391. Paniculatum.
 5518. Secans.
 6230. Paniculatum.
 6402. Paniculatum.

BRITTON, N. L., AND COWELL, J. F.

476. Paniculatum.
 1013. Paniculatum.
 1405. Secans.
 1449. Millegrana.
 2186. Orbiculatum.
 4070. Plicatulum.
 4118. Decumbens.
 4149. Paniculatum.
 9872. Paniculatum.

BRITTON, N. L., COWELL, J. F., AND
BROWN, S.

4476. Notatum.
 4636. Laxum.
 4639. Laxum.
 4686. Laxum.
 4690. Laxum.
 4717. Laxum.
 4909. Laxum.
 5041. Laxum.

BRITTON, N. L., COWELL, J. F., AND
HESS, W. E.

1656. Caespitosum.
 1839. Caespitosum.

BRITTON, N. L., AND FISHLOCK, W. C.

986. Laxum.
 1041. Laxum.
 1097. Plicatulum.

BRITTON, N. L., AND HAZEN, T. E.

1201. *Conjugatum*.
 1572. *Multicaule*.
 1582. *Decumbens*.
 1685. *Conjugatum*.
 1688. *Decumbens*.

BRITTON, N. L., HAZEN, T. E., AND
FREEMAN, W. G.

1139. *Orbiculatum*.
 1150. *Virgatum*.

BRITTON, N. L., HAZEN, T. E., AND
MENDELSON, W.

1249. *Nutans*.

BRITTON, N. L., AND HESS, W. E.

2833. *Conjugatum*.
 2835. *Orbiculatum*.

BRITTON, N. L., AND MILLSPAUGH, C. F.

3089. *Caespitosum*.

BRITTON, N. L., AND SHAFER, J. A.

257. *Laxum*.
 292. *Laxum*.
 375. *Plicatulum*.
 506. *Laxum*.
 694. *Laxum*.
 764. *Plicatulum*.
 880. *Laxum*.
 1624. *Notatum*.
 1680. *Decumbens*.
 2135. *Decumbens*.
 3027. *Laxum*.

BRITTON, N. L., STEVENS, F. L., AND
HESS, W. E.

2395. *Laxum*.
 2398. *Blodgettii*.

BRITTON, N. L., AND WHEELER, W. M.

190. *Laxum*.

BRITTON, N. L., AND WILSON, P.

148. *Langei*.
 6116. *Capillifolium*.
 14282. *Pulchellum*.
 14456. *Virgatum*.
 14695. *Minus*.
 14697. *Rottboellioides*.

BRITTON, N. L., AND WILSON, P.—Con.

14707. *Plicatulum*.
 14805. *Multicaule*.
 14890. *Caespitosum*.
 15665. *Propinquum*.

BRITTON, N. L., WILSON, P., AND
LÉON, BROTHER.

6026. *Plicatulum*.
 15294. *Bakeri*.
 15337. *Bakeri*.
 15790. *Blodgettii*.

BROADWAY, W. E.

15. *Melanospermum*.
 19. *Conjugatum*.
 58. *Arundinaceum*.
 62. *Saccharoides*.
 131. *Paniculatum*.
 132. *Conjugatum*.
 144. *Virgatum*.
 170. *Multicaule*.
 261. *Nutans*.
 425. *Conjugatum*.
 426. *Decumbens*.
 468. *Decumbens*.
 523. *Conjugatum*.
 876. *Nutans*.
 887. *Millegrana*.
 971. *Millegrana*.
 1729. *Nutans*.
 1744. *Conjugatum pubescens*.
 1793. *Distichum*.
 1793½. *Notatum*.
 2126. *Multicaule*.
 2175. *Coryphaeum*.
 2369. *Virgatum*.
 2603. *Pilosum*.
 2618. *Densum*.
 2811. *Nutans*.
 2919. *Saccharoides*.
 2996. *Paniculatum*.
 3045. *Vaginatum*.
 3066. *Millegrana*.
 3148. *Plicatulum*.
 3979. *Saccharoides*.
 4058. *Virgatum*.
 4361. *Conjugatum*.
 4390. *Virgatum*.
 4513. *Distichum*.
 4616. *Plicatulum*.

BROADWAY, W. E.—Continued.

- 4655. *Vaginat*um.
- 4685. *Paniculat*um.
- 4696. *Millegrana*.
- 4914. *Nutans*.
- 4921. *Millegrana*.
- 4939. *Virgatum*.
- 4947. *Virgatum*.
- 4969. *Pilosum*.
- 4970. *Plicatul*um.
- 4983. *Convexum*.
- 4987. *Virgatum*.
- 5331. *Nutans*.
- 5947. *Coryphaeum*.
- 6353. *Distichum*.
- 6946. *Pumilum*.
- 7437. *Oligostachyum*.

BROOKS, A. J.

- 29. *Virgatum*.
- 34. *Conjugatum*.

BROWN, S., AND BRITTON, N. L.

- 56. *Propinquum*.
- 100. *Vaginat*um.
- 826. *Distichum*.

BROWN, S., BRITTON, N. L., AND
BISSET, P.

- 2005. *Dilatatum*.

BRYANT, E. M.

- 5. *Nutans*.

BUCH, W.

- 1091. *Heterotrichon*.
- 1217. *Fimbriatum*.
- 1591. *Conjugatum*.
- 1760. *Distachyon*.
- 1929. *Paniculatum*.

BUCHINGER.

- 960. *Notatum*.

BUCHTIEN, OTTO

- 14. *Pilosum*.
- 15. *Pilosum*.
- 16. *Multicaule*.
- 33. *Paniculatum*.
- 47. *Decumbens*.
- 48. *Decumbens*.

BUCHTIEN, OTTO—Continued

- 52. *Virgatum*.
- 65. *Saccharoides*.
- 69. *Conjugatum*.
- 79. *Minus*.
- 415. *Paniculatum*.
- 1162. *Conjugatum*.
- 1164. *Paniculatum*.
- 2504. *Conjugatum*.
- 2504a. *Conjugatum*.
- 2513. *Saccharoides*.
- 3125. *Humboldtianum*.
- 3126. *Distichum*.
- 4196. *Paniculatum*.
- 4269. *Paniculatum*.
- 4518. *Distichum*.
- 5314. *Decumbens*.
- 5323. *Paniculatum*.
- 5325. *Conjugatum*.
- 6435. *Paniculatum*.
- 6436. *Paniculatum*.
- 6445. *Decumbens*.
- 7105. *Decumbens*.
- 7106. *Decumbens*.
- 7108. *Pilosum*.
- 7110. *Malacophyllum*.

BÜNNEMEYER

- 1320. *Conjugatum*.
- 1394. *Conjugatum*.
- 2246. *Conjugatum*.
- 7398. *Conjugatum*.

BURCHELL, W. J.

- 1565. *Vaginat*um
- 1565 part. *Multicaule*.
- 8864. *Orbiculatum*.

BUSH, B. F.

- 59. *Circulare*.
- 63. *Circulare*.
- 107. *Circulare*.
- 183. *Repens*.
- 196. *Dilatatum*
- 205. *Urvillei*.
- 207. *Longipilum*.
- 209. *Ciliatifolium*.
- 213. *Circulare*.
- 225. *Setaceum*.
- 264. *Langei*.
- 294. *Distichum*.
- 311. *Floridanum glabratum*.

BUSH, B. F.—Continued

- 334. Floridanum.
- 336. Pubescens.
- 340. Plicatulum.
- 376. Repens.
- 432. Pubiflorum glabrum.
- 687. Repens.
- 691. Circulare.
- 887. Circulare.
- 943. Pubescens.
- 963. Langei.
- 969. Ciliatifolium.
- 978. Pubiflorum glabrum.
- 1049. Floridanum.
- 1055. Dissectum.
- 1163. Stramineum.
- 1303. Repens.
- 1763. Pubescens.
- 1771. Stramineum
- 3128. Pubescens.
- 3129. Pubescens.
- 3248. Circulare.
- 3393. Pubiflorum glabrum.
- 3695. Repens.
- 3711. Pubiflorum glabrum.
- 4818. Stramineum.
- 4823. Pubescens.
- 5086. Circulare.
- 5087. Circulare.
- 5164. Repens.
- 5183. Circulare.
- 6200. Repens.
- 6329. Stramineum.
- 6501. Stramineum.
- 8156. Stramineum.
- 8165. Stramineum.
- 8723. Circulare.
- 8723A. Circulare.
- 9944. Repens.

BUTLER, G. D.

- 20. Floridanum glabratum.

CALDERÓN, SALVADOR

- 486. Costaricense.
- 492. Plicatulum.
- 645. Paniculatum.
- 869. Virgatum.
- 944. Adoperiens.
- 945. Conjugatum pubescens.
- 1150. Fasciculatum.
- 1151. Fasciculatum.
- 1152. Humboldtianum.

CALDERÓN, SALVADOR—Continued

- 1154. Virgatum.
- 1333. Paniculatum.
- 1690. Virgatum.
- 1744. Langei.
- 1879. Repens.
- 1881. Fasciculatum.
- 2272. Stellatum.

CANBY, W. N., AND ROSE, J. N.

- 805. Floridanum glabratum.

CAPANEMA, G.

- 5416. Parviflorum.
- 5417. Vaginatum.
- 5418. Distichum.
- 5427. Vaginatum.

CÁRDENAS, MARTIN (MULFORD BIOL. EXPL.)

- 1175. Conjugatum.
- 1656. Virgatum.

CARLETON, M. A.

- 171. Conjugatum.
- 182. Paniculatum.

CARVER, G. W.

- 6. Setaceum.
- 14. Ciliatifolium.
- 16. Pubescens.
- 24. Longipilum.
- 38. Distichum.
- 50. Laeve.
- 51. Longipilum.
- 74. Longipilum.
- 75. Laeve.
- 83. Difforme.
- 89. Floridanum.
- 90. Setaceum.
- 91. Boscianum.

CELESTINE, BROTHER

- 20. Virgatum.

CHAMBERLAIN, EDITH

- 123. Circulare.

CHAMBLISS, C. E.

- 84. Ciliatifolium.

CHANDLER, H. P.

- 5331. Distichum.

CHAPLINE, W. R.

38147 (Forest Serv.). Supinum.

CHAPMAN, A. W.

3044b part. Floridanum.

3044b part. Difforme.

3048a. Lentiferum.

6075a. Lentiferum.

CHASE, AGNES

2575. Pubescens.

2586. Pubescens.

2593. Laeve.

2600. Laeve.

2941. Pubescens.

3003. Pubescens.

3008. Pubescens.

3011. Pubescens.

3018. Pubescens.

3021½. Circulare.

3122. Setaceum.

3491. Pubescens.

3494. Setaceum.

3494½. Debile.

3568. Psammophilum.

3634. Laeve.

3644. Floridanum.

3645. Floridanum glabratum.

3648. Laeve.

3649. Pubescens.

3650. Setaceum.

3670. Boscianum.

3684. Longipilum.

3685. Setaceum.

3836. Circulare.

3840. Blodgettii.

3849. Ciliatifolium.

3853. Ciliatifolium.

3861. Blodgettii.

3862. Supinum.

3869. Longepedunculatum.

3878. Laeve.

3883. Monostachyum.

3886. Longepedunculatum.

3927. Vaginatum.

3928. Caespitosum.

3950. Rigidifolium.

3951. Ciliatifolium.

3960. Ciliatifolium.

3961. Distichum.

3971. Debile.

3974. Longepedunculatum.

3975. Ciliatifolium.

CHASE, AGNES—Continued

3976. Ciliatifolium.

3983. Longipilum.

3987. Longepedunculatum.

3988. Ciliatifolium.

3993. Ciliatifolium.

3998. Lentiferum.

4003. Ciliatifolium.

4010. Ciliatifolium.

4025. Giganteum.

4027. Debile.

4033. Longepedunculatum.

4034. Longepedunculatum.

4035. Longepedunculatum.

4038. Lentiferum.

4040. Longipilum.

4042. Supinum.

4046. Ciliatifolium.

4046½. Setaceum.

4047. Longepedunculatum.

4048. Longepedunculatum.

4049. Ciliatifolium.

4054. Ciliatifolium.

4056. Longepedunculatum.

4057. Longipilum.

4069. Debile.

4071. Rigidifolium.

4075. Propinquum.

4083. Longipilum.

4084. Ciliatifolium.

4089. Distichum.

4090. Supinum.

4092. Langei.

4093. Pubiflorum glabrum.

4096. Langei.

4107. Ciliatifolium.

4108. Pubiflorum glabrum.

4109. Floridanum.

4110. Difforme.

4111. Ciliatifolium.

4117. Supinum.

4124. Supinum.

4128. Supinum.

4138. Supinum.

4145. Longipilum.

4145½. Ciliatifolium.

4146. Longepedunculatum.

4147. Supinum.

4152. Longepedunculatum.

4160. Distichum.

4167. Longepedunculatum.

4168. Ciliatifolium.

4169. Debile.

CHASE, AGNES—Continued

- 4178. Supinum.
- 4184. Rigidifolium.
- 4186. Debile.
- 4197. Supinum.
- 4210. Plicatum.
- 4221. Floridanum.
- 4223. Ciliatifolium.
- 4230. Longipilum.
- 4231. Supinum.
- 4236. Pubescens.
- 4237. Ciliatifolium.
- 4255. Laeve.
- 4270. Bifidum.
- 4275. Ciliatifolium.
- 4285. Dilatum.
- 4311. Ciliatifolium.
- 4313. Dissectum.
- 4317. Laeve.
- 4319. Lentiferum.
- 4324. Dilatum.
- 4326. Floridanum.
- 4327. Rigidifolium.
- 4329. Floridanum glabratum.
- 4329½. Floridanum.
- 4330. Laeve.
- 4345. Pubescens.
- 4347. Floridanum.
- 4347½. Difforme.
- 4350. Laeve.
- 4354. Laeve.
- 4354½. Rigidifolium.
- 4355. Boscianum.
- 4367. Ciliatifolium.
- 4388. Urvillei.
- 4390. Floridanum.
- 4391. Plicatum.
- 4398. Langei.
- 4399. Pubescens.
- 4402. Pubescens.
- 4415. Langei.
- 4417. Pubescens.
- 4435. Ciliatifolium.
- 4436. Ciliatifolium.
- 4440. Pubiflorum glabrum.
- 4441. Ciliatifolium.
- 4442. Circulare.
- 4443. Floridanum glabratum.
- 4447. Circulare.
- 4450. Circulare.
- 4480. Pubescens.
- 4494. Longepedunculatum.
- 4496. Boscianum.

CHASE, AGNES—Continued

- 4505. Laeve.
- 4510. Boscianum.
- 4511. Ciliatifolium.
- 4546. Ciliatifolium.
- 4547. Ciliatifolium.
- 4552. Ciliatifolium.
- 4571. Circulare.
- 4572. Supinum.
- 4574. Debile.
- 4587. Floridanum.
- 4598. Praecox.
- 4606. Lentiferum.
- 5293. Stramineum.
- 5872. Pubescens.
- 6044. Stramineum.
- 6047. Stramineum.
- 6052. Pubescens.
- 6062. Plicatum.
- 6064. Stramineum.
- 6074. Plicatum.
- 6075. Supinum.
- 6087. Ciliatifolium.
- 6107. Urvillei.
- 6136. Setaceum.
- 6137. Longipilum.
- 6150. Secans.
- 6151. Plicatum.
- 6152. Conjugatum.
- 6153. Millegrana.
- 6154. Paniculatum.
- 6164. Millegrana.
- 6170. Decumbens.
- 6172. Boscianum.
- 6173. Virgatum.
- 6174. Secans.
- 6176. Decumbens.
- 6182. Laxum.
- 6186. Decumbens.
- 6187. Millegrana.
- 6193. Secans.
- 6220. Rupestre.
- 6233. Distichum.
- 6234. Boscianum.
- 6235. Decumbens.
- 6236. Notatum.
- 6237. Millegrana.
- 6238. Secans.
- 6239. Paniculatum.
- 6246. Rupestre.
- 6257. Virgatum.
- 6257½. Millegrana.
- 6259. Rupestre.

CHASE, AGNES—Continued

6262. Molle.
 6264. Decumbens.
 6274. Rupestre.
 6275. Rupestre.
 6279. Laxum.
 6282. Propinquum.
 6287. Notatum.
 6296. Fimbriatum.
 6299. Rupestre.
 6300. Laxum.
 6303. Millegrana.
 6307. Vaginatum.
 6309. Secans.
 6312. Rupestre.
 6313. Laxum.
 6314. Notatum.
 6315. Rupestre.
 6322. Molle.
 6323. Rupestre.
 6329. Fimbriatum.
 6338. Molle.
 6339. Plicatulum.
 6340. Decumbens.
 6343. Vaginatum.
 6344. Notatum.
 6346. Laxum.
 6356. Millegrana.
 6359. Millegrana.
 6361. Decumbens.
 6367. Laxum.
 6368. Minus.
 6369. Laxum.
 6372. Secans.
 6373. Millegrana.
 6382. Secans.
 6387. Secans.
 6389. Conjugatum.
 6390. Paniculatum.
 6399. Decumbens.
 6401. Notatum.
 6402. Laxum.
 6404. Conjugatum.
 6408. Laxum.
 6409. Secans.
 6423. Laxum.
 6424. Notatum.
 6427. Caespitosum.
 6428. Molle.
 6430. Plicatulum.
 6433. Propinquum.
 6437. Laxum.
 6439. Propinquum.

CHASE, AGNES—Continued

6441. Millegrana.
 6444. Secans.
 6446. Laxum.
 6459. Paniculatum.
 6465. Secans.
 6466. Plicatulum.
 6473. Decumbens.
 6478. Paniculatum.
 6483. Distichum.
 6489. Caespitosum.
 6494. Distichum.
 6499. Laxum.
 6537. Fimbriatum.
 6546. Plicatulum.
 6550. Fimbriatum.
 6553. Paniculatum.
 6559. Secans.
 6565. Millegrana.
 6572. Propinquum.
 6573. Laxum.
 6575. Laxum.
 6579. Blodgettii.
 6580. Blodgettii.
 6581. Secans.
 6584. Laxum.
 6585. Notatum.
 6588. Saugetii.
 6591. Laxum.
 6592. Plicatulum.
 6597. Saugetii.
 6598. Saugetii.
 6599. Virgatum.
 6601. Laxum.
 6605. Blodgettii.
 6605½. Laxum.
 6607. Molle.
 6608. Molle.
 6609. Laxum.
 6613. Propinquum.
 6618. Laxum.
 6625. Laxum.
 6626. Millegrana.
 6634½. Propinquum.
 6635. Laxum.
 6637. Millegrana.
 6639. Notatum.
 6641. Secans.
 6642. Virgatum.
 6644. Plicatulum.
 6646. Millegrana.
 6648. Decumbens.
 6649. Virgatum.

CHASE, AGNES—Continued

6650. Millegrana.
 6652. Plicatulum.
 6655. Millegrana.
 6658. Laxum.
 6661. Propinquum.
 6665. Fimbriatum.
 6678. Laxum.
 6687. Millegrana.
 6690. Distichum.
 6694. Vaginatulum.
 6697. Laxum.
 6698. Secans.
 6703. Virgatum.
 6704. Millegrana.
 6705. Virgatum.
 6706. Virgatum.
 6707. Secans.
 6716. Secans.
 6718. Decumbens.
 6722. Conjugatum.
 6723. Secans.
 6724. Boscianum.
 6725. Millegrana.
 6727. Paniculatum.
 6729. Notatum.
 6739. Orbiculatum.
 6740. Virgatum.
 6741. Molle.
 6756. Laxum.
 6759. Laxum.
 6761. Millegrana.
 6775½ Millegrana.
 6777. Plicatulum.
 6779. Notatum.
 6785. Millegrana.
 6787. Secans.
 6791. Densum.
 6792. Virgatum.
 6793. Millegrana.
 6794. Millegrana.
 6811. Rupestre.
 6813. Rupestre.
 6820. Molle.
 7001. Setaceum.
 7003. Setaceum.
 7007. Pubescens.
 7008. Pubescens.
 7017. Ciliatifolium.
 7030. Ciliatifolium.
 7046. Praecox.
 7059. Laeve.
 7060. Difforme.

CHASE, AGNES—Continued

7061. Plicatulum.
 7096. Ciliatifolium.
 7102. Dilatatum.
 7113. Ciliatifolium.
 7143. Setaceum.
 7144. Debile.
 7182. Praecox.
 7195. Setaceum.
 7516. Setaceum.
 7638. Nutans.
 7655. Conjugatum pubescens.
 7656. Pleostachyum.
 7659. Plicatulum.
 7682. Millegrana.
 7701. Distichum.
 7718. Virgatum.
 7727. Pumilum.
 7730. Oligostachyum.
 7731. Nutans.
 7736. Orbiculatum.
 7754. Coryphaeum.
 7758. Vaginatulum.
 7761. Pumilum.
 7769. Pleostachyum.
 7838. Conjugatum pubescens.
 7839. Vaginatulum.
 7840. Millegrana.
 7854. Multicaule.
 7859. Oligostachyum.
 7860. Pilosum.
 7863. Oligostachyum.
 7865. Molle.
 7868. Paniculatum.
 7874. Molle.
 7884. Multicaule.
 7890. Pilosum.
 7903. Pleostachyum.
 7919. Repens.
 7963. Molle.
 7971. Pilosum.
 7979. Clavuliferum.
 7981. Pulchellum.
 7982. Pulchellum.
 7983. Pumilum.
 7986. Multicaule.
 7987. Plicatulum.
 7999. Gardnerianum.
 8001. Parviflorum.
 8020. Vaginatulum.
 8025. Pilosum.
 8037. Distichum.
 8045. Pleostachyum.

CHASE, AGNES—Continued

8047. *Pleostachyum*.
 8047½. *Oligostachyum*.
 8050. *Molle*.
 8055. *Conjugatum*.
 8081. *Pumilum*.
 8083. *Pilosum*.
 8092. *Plicatulum*.
 8094. *Clavuliferum*.
 8095. *Molle*.
 8107½. *Clavuliferum*.
 8126. *Pilosum*.
 8140. *Densum*.
 8142. *Orbiculatum*.
 8148. *Densum*.
 8154. *Conjugatum pubescens*.
 8156. *Coryphaeum*.
 8172. *Pumilum*.
 8174. *Urvillei*.
 8189. *Nutans*.
 8195. *Conjugatum pubescens*.
 8199. *Nutans*.
 8213. *Notatum*.
 8219. *Millegrana*.
 8221. *Vaginatum*.
 8234. *Pumilum*.
 8235. *Urvillei*.
 8240. *Paniculatum*.
 8258. *Distichum*.
 8259. *Nutans*.
 8341. *Nutans*.
 8346. *Pilosum*.
 8348. *Paniculatum*.
 8351. *Decumbens*.
 8359. *Plicatulum*.
 8360. *Notatum*.
 8393. *Coryphaeum*.
 8409. *Conjugatum*.
 8410. *Conspersum*.
 8438. *Pumilum*.
 8443. *Pumilum*.
 8458. *Vaginatum*.
 8479. *Nutans*.
 8483. *Nutans*.
 8483½. *Decumbens*.
 8492. *Pumilum*.
 8504. *Conspersum*.
 8509. *Dilatatum*.
 8513. *Conspersum*.
 8519. *Paniculatum*.
 8531. *Pilosum*.
 8534. *Pilosum*.
 8562. *Nutans*.

CHASE, AGNES—Continued

8567. *Nutans*.
 8586. *Pumilum*.
 8598. *Dilatatum*.
 8600. *Paniculatum*.
 8612. *Paniculatum*.
 8637. *Urvillei*.
 8650. *Paniculatum*.
 8672. *Plicatulum*.
 8677. *Plicatulum*.
 8691. *Notatum*.
 8695½. *Malacophyllum*.
 8735. *Paniculatum*.
 8752. *Distichum*.
 8769. *Malacophyllum*.
 8770. *Conspersum*.
 8791. *Malacophyllum*.
 8816. *Gardnerianum*.
 8840. *Conjugatum pubescens*.
 8846. *Plicatulum*.
 8847. *Plicatulum*.
 8863. *Plicatulum*.
 8892. *Malacophyllum*.
 8894. *Conspersum*.
 8908. *Clavuliferum*.
 8944. *Pilosum*.
 8956. *Coryphaeum*.
 8962. *Coryphaeum*.
 8964. *Gardnerianum*.
 8973. *Plicatulum*.
 8976. *Plicatulum*.
 8984. *Paniculatum*.
 8987. *Clavuliferum*.
 8989. *Convexum*.
 8999. *Decumbens*.
 9015. *Gardnerianum*.
 9030. *Gardnerianum*.
 9043. *Convexum*.
 9044. *Plicatulum*.
 9049. *Gardnerianum*.
 9058. *Coryphaeum*.
 9063. *Coryphaeum*.
 9092. *Notatum*.
 9100. *Stellatum*.
 9104. *Coryphaeum*.
 9109. *Convexum*.
 9111. *Clavuliferum*.
 9114. *Plicatulum*.
 9120. *Nutans*.
 9121. *Pilosum*.
 9124. *Coryphaeum*.
 9127. *Gardnerianum*.
 9162. *Convexum*.

CHASE, AGNES—Continued

- 9183. Gardnerianum.
- 9190. Multicaule.
- 9199. Nutans.
- 9212. Pectinatum.
- 9216. Pectinatum.
- 9250. Pectinatum.
- 9253. Stellatum.
- 9254. Coryphaeum.
- 9256. Plicatulum.
- 9258. Malacophyllum.
- 9263. Paniculatum.
- 9265. Urvillei.
- 9267. Coryphaeum.
- 9281. Plicatulum.
- 9290. Coryphaeum.
- 9295. Stellatum.
- 9308. Stellatum.
- 9333. Distichum.
- 9339. Conspersum.
- 9372. Coryphaeum.
- 9374. Pumilum.
- 9425. Urvillei.
- 9426½. Conjugatum pubescens.
- 9433. Urvillei.
- 9448. Nutans.
- 9473. Urvillei.
- 9487. Conspersum.
- 9488. Virgatum.
- 9502. Conjugatum pubescens.
- 9504. Paniculatum.
- 9510. Decumbens.
- 9512. Nutans.
- 9610. Conspersum.
- 9614. Nutans.
- 9622. Acuminatum.
- 9632. Paniculatum.
- 9636. Nutans.
- 9767. Urvillei.
- 9768. Pumilum.
- 9802. Coryphaeum.
- 9810. Millegrana.
- 9864. Paniculatum.
- 9895. Pumilum.
- 9930. Nutans.
- 9937. Laeve.
- 9938. Pubescens.
- 9945. Circulare.
- 9946. Circulare.
- 9948. Pubescens.
- 9963. Ciliatifolium.
- 9964. Pubescens.
- 9965. Circulare.

CHASE, AGNES—Continued

- 9967. Circulare.
- 9969. Circulare.

CHOUSSY, F.

- A 17. Plicatulum.
- A 18. Humboldtianum.
- 37. Millegrana.

CHRIST, H.

- 1800. Heterotrichon.
- 2185. Virgatum.

CLAUDE JOSEPH, BROTHER

- 2020. Dilatatum.
- 2164. Dilatatum.
- 2270. Distichum.
- 2271. Dilatatum.
- 2640a. Distichum.
- 4146. Distichum.
- 4718. Distichum.
- 5734. Urvillei.

CLAUSSEN, P.

- 1020. Stellatum.

CLEMENTS, F. E.

- 2427. Unispicatum.
- 2817. Stramineum.

CLOKEY, I. W.

- 1928. Tenellum

COCKS, R. S.

- 418. Conjugatum.
- 2187. Plicatulum.
- 2197. Floridanum.
- 3009. Distichum.
- 3010. Langei.
- 3512. Dissectum.

COKER, W. C.

- 35. Circulare.

COLLINS, F. S.

- 155 part. Ciliatifolium.
- 155 part. Propinquum.
- 156. Dilatatum.
- 157. Conjugatum.

COLLINS, G. N., AND DOYLE, C. B.

- 124. Stellatum.

COLLINS, G. N., AND GOLL, G. P.

05. *Conjugatum*.
06. *Paniculatum*.

COMBS, ROBERT

2. *Longipilum*.
4. *Setaceum*.
18. *Floridanum glabratum*.
24. *Praecox*.
30. *Distichum*.
31. *Distichum*.
36. *Boscianum*.
45. *Lentiferum*.
52. *Distichum*.
56. *Longepedunculatum*.
62. *Praecox*.
64. *Setaceum*.
76. *Longepedunculatum*.
77. *Longipilum*.
158½. *Laeve*.
197. *Longipilum*.
202. *Dilatatum*.
214. *Plicatulum*.
229. *Longepedunculatum*.
229½. *Supinum*.
232. *Setaceum*.
236. *Ciliatifolium*.
239. *Floridanum*.
240. *Plicatulum*.
241. *Distichum*.
242. *Boscianum*.
243. *Ciliatifolium*.
257. *Ciliatifolium*.
285. *Bifidum*.
292. *Laeve*.
293. *Boscianum*.
304. *Ciliatifolium*.
309. *Longipilum*.
310. *Boscianum*.
310½. *Laeve*.
317. *Distichum*.
322. *Boscianum*.
323. *Supinum*.
343. *Floridanum glabratum*.
343a. *Floridanum*.
344. *Laeve*.
345. *Setaceum*.
350. *Setaceum*.
351. *Dissectum*.
357. *Ciliatifolium*.
359. *Ciliatifolium*.
367. *Laeve*.
377. *Setaceum*.

COMBS, ROBERT—Continued

384. *Boscianum*.
385. *Laeve*.
388. *Distichum*.
395. *Boscianum*.
402. *Setaceum*.
404. *Supinum*.
405. *Ciliatifolium*.
409. *Laeve*.
420. *Distichum*.
423. *Boscianum*.
435. *Ciliatifolium*.
436. *Ciliatifolium*.
442. *Setaceum*.
459. *Ciliatifolium*.
471. *Floridanum*.
472. *Bifidum*.
481. *Bifidum*.
485. *Lentiferum*.
490. *Floridanum glabratum*.
492. *Floridanum*.
495. *Supinum*.
501. *Dissectum*.
515. *Setaceum*.
518. *Pubescens*.
519. *Ciliatifolium*.
522. *Boscianum*.
527. *Dissectum*.
528. *Longipilum*.
533. *Bifidum*.
539a. *Distichum*.
540. *Floridanum*.
542. *Plicatulum*.
543. *Ciliatifolium*.
546. *Setaceum*.
558. *Bifidum*.
561. *Plicatulum*.
566. *Boscianum*.
578. *Dissectum*.
581. *Bifidum*.
593. *Bifidum*.
594. *Floridanum*.
598. *Plicatulum*.
606. *Setaceum*.
607. *Plicatulum*.
629. *Pubescens*.
630. *Laeve*.
632. *Lentiferum*.
635. *Floridanum glabratum*.
636. *Floridanum*.
637. *Floridanum*.
638. *Lentiferum*.
639. *Ciliatifolium*.

COMBS, ROBERT—Continued

- 640. Boscianum.
- 679. Dissectum.
- 689. Dissectum.
- 693. Longipilum.
- 699. Pubescens.
- 701. Floridanum.
- 710. Distichum.
- 718. Laeve.
- 719. Supinum.
- 720. Debile.
- 726. Laeve.
- 728. Distichum.
- 735. Ciliatifolium.
- 736. Ciliatifolium.
- 746. Boscianum.
- 755. Supinum.
- 759. Longipilum.
- 765a. Vaginatum.
- 766. Vaginatum.
- 770. Ciliatifolium.
- 782. Longepedunculatum.
- 800. Ciliatifolium.
- 808. Supinum.
- 810. Laeve.
- 815. Lentiferum.
- 819. Lentiferum.
- 833. Dissectum.
- 840. Plicatulum.
- 844. Rigidifolium.
- 852. Debile.
- 866. Bifidum.
- 867. Bifidum.
- 872. Repens.
- 892. Debile.
- 896. Rigidifolium.
- 901. Supinum.
- 905. Debile.
- 911. Rigidifolium.
- 912. Repens.
- 916. Giganteum.
- 917. Ciliatifolium.
- 922. Caespitosum.
- 925. Ciliatifolium.
- 942. Vaginatum.
- 948. Longipilum.
- 956. Monostachyum.
- 959. Giganteum.
- 965. Distichum.
- 974. Lentiferum.
- 975. Lentiferum.
- 986. Floridanum glabratum.
- 993. Rigidifolium.
- 1001. Bifidum.

COMBS, ROBERT—Continued

- 1002. Longipilum.
- 1019. Debile.
- 1020. Longepedunculatum.
- 1020½. Supinum.
- 1026. Lentiferum.
- 1174. Floridanum glabratum.
- 1175. Supinum.
- 1176. Pubescens.
- 1179. Setaceum.
- 1185. Plicatulum.
- 1194½. Lentiferum.
- 1201. Repens.
- 1202. Lentiferum.
- 1217½. Longipilum.
- 1223. Rigidifolium.
- 1229. Lentiferum.
- 1245. Distichum.
- 1272. Distichum.
- 1276. Lentiferum.
- 1285. Ciliatifolium.
- 1293. Vaginatum.
- 1318. Longepedunculatum.
- 1318½. Ciliatifolium.
- 1329. Ciliatifolium.
- 1351. Longipilum.
- 1374. Setaceum.
- 1375. Rigidifolium.
- 1392. Plicatulum.
- 1405. Pubiflorum glabrum.
- 1408. Ciliatifolium.
- 1410. Dilatatum.
- 1434. Distichum.

COMBS, R., AND BAKER, C. H.

- 1029. Rigidifolium.
- 1032. Ciliatifolium.
- 1033. Supinum.
- 1034. Debile.
- 1040. Bifidum.
- 1059. Bifidum.
- 1107. Rigidifolium.
- 1142. Praecox.
- 1151. Langei.
- 1158. Lentiferum.

COMBS, R., AND ROLFS, P. H.

- 85. Plicatulum.
- 86. Plicatulum.
- 105. Longepedunculatum.
- 121. Longepedunculatum.
- 123. Supinum.
- 124. Boscianum.
- 128. Supinum.

COMBS, R. AND ROLFS, P. H.—Con.

- 146. Debile.
- 159. Boscianum.
- 166. Supinum.
- 175. Pubescens.
- 196. Setaceum.

COMMONS, A.

- 85. Dissectum.
- 86. Circulare.
- 87. Pubescens.
- 88. Debile.
- 232. Psammophilum.
- 310. Floridanum glabratum.
- 312. Longipilum.
- 313. Pubescens.
- 314. Dissectum.

CONZATTI, C.

- 3600. Hartwegianum.
- 3616. Notatum.
- 3641. Humboldtianum.
- 3770. Conjugatum pubescens.
- 4042 $\frac{3}{4}$. Conjugatum.
- 4364. Stellatum.

CONZATTI, C., AND GONZÁLES, V.

- 341. Notatum.
- 349. Lividum.
- 350. Pubiflorum.
- 440. Humboldtianum.
- 1160. Botterii.

COOK, O. F., AND DOYLE, C. B.

- 324. Conjugatum.
- 462. Conjugatum pubescens.

COOK, O. F., AND GILBERT, G. B.

- 858. Candidum.
- 1531. Virgatum.

COOK, O. F., AND GRIGGS, R. F.

- 431. Orbiculatum.

COOK, O. F., SCOFIELD, C. S., AND
DOYLE, C. B.

- 53. Fimbriatum.
- 59. Paniculatum.
- 61. Fimbriatum.
- 80. Conjugatum.
- 87. Lindenianum.
- 91. Distichum.
- 103. Minus.
- 174. Arundinaceum.
- 180. Conjugatum.

COOPER, J. J.

- 75. Candidum.
- 5995 (Dist. Smith). Candidum.

COTTAM, W. P.

- 3388. Distichum.

COVILLE, F. V., AND FUNSTON, F.

- 1281. Distichum.

COWGILL, H. B.

- 423. Plicatulum.
- 627. Decumbens.
- 691. Millegrana.
- 695. Virgatum.

CRAWFORD, D. L.

- 750. Distichum.

CURRAN, H. M.

- 189. Conjugatum.
- 258. Repens.
- 366. Fasciculatum.

CURRAN, H. M., AND HAMAN, M.

- 569. Vaginatum.
- 578. Vaginatum.
- 889. Unispicatum.
- 1040. Conjugatum.

CURTISS, A. H.

- 3. Fimbriatum.
- 156. Laxum.
- 165. Blodgettii.
- 192. Conjugatum.
- 327. Decumbens.
- 374. Distortum.
- 375. Rottboellioides.
- 379. Lineare.
- 501. Virgatum.
- 523. Lindenianum.
- 751. Vaginatum.
- 764. Distichum.
- 3563. Repens.
- 3564. Dissectum.
- 3567. Distichum.
- 3567* part. Distichum.
- 3567* part. Vaginatum.
- 3569 part. Praecox.
- 3569 part. Lentiferum.
- 3570. Difforme.
- 3571*. Giganteum.
- 3572. Bifidum.

CURTISS, A. H.—Continued

3573 part. Boscianum.
 3573 part. Lentiferum.
 3575. Caespitosum.
 3576 part. Pubescens.
 3576 part. Supinum.
 3576*. Vaginatum.
 3601. Caespitosum.
 4021. Distichum.
 4024. Praecox.
 4025. Boscianum.
 4744. Praecox.
 4990 part. Lentiferum.
 4990 part. Longipilum.
 5021. Difforme.
 5022. Boscianum.
 5078. Distichum.
 5079. Ciliatifolium.
 5080. Bifidum.
 5081 part. Dissectum.
 5081 part. Repens.
 5090. Supinum.
 5092 part. Debile.
 5092 part. Laeve.
 5098. Laeve.
 5194. Lentiferum.
 5198. Setaceum.
 5440. Blodgettii.
 5517. Floridanum.
 5580. Lentiferum.
 5590. Bifidum.
 5728. Lentiferum.
 5741. Distichum.
 5745. Boscianum.
 5750. Floridanum.
 5760. Boscianum.
 5923. Plicatulum.
 5937. Laeve.
 5970. Repens.
 6017. Ciliatifolium.
 6018. Supinum.
 6502. Dilatatum.
 6508. Urvillei.
 6509. Boscianum.
 6666. Rigidifolium.

DASH, J. S.

455. Virgatum.
 584. Laxum.

DAVIDSON, A.

3160. Dilatatum.

DAVIS, JOHN

1566. Dilatatum.
 1591. Laeve.
 7905. Boscianum.

DAVY, J. B.

788. Dilatatum.

DAVY, J. B., AND BLASDALE, W. C.

5937. Distichum.

DEAM, C. C.

80. Paniculatum.
 6038. Orbiculatum.
 6205. Notatum.
 7302. Pubescens.
 7538. Circulare.
 10155. Circulare.
 13590. Pubescens.
 17161. Pubescens.
 18229. Pubescens.
 18846. Circulare.
 22201. Repens.
 22247. Repens.
 22309. Repens.
 24010. Circulare.
 24042. Circulare.
 24346. Repens.
 26068. Pubescens.
 26231. Pubescens.
 26591. Repens.
 27992. Pubescens.
 28316. Circulare.
 28973. Circulare.
 29090. Circulare.
 30189. Circulare.
 32940. Pubiflorum glabrum.
 32994. Pubescens.
 33404. Pubescens.
 35003. Pubescens.
 35006. Pubescens.
 35068. Pubescens.
 37824. Pubescens.
 39372. Stramineum.
 39689. Stramineum.
 39775A. Pubescens.
 41540. Pubescens.
 41593. Pubescens.
 41745. Pubescens.
 41829A. Pubescens.
 42159. Pubescens.
 42473. Pubescens.

DEAM, C. C.—Continued

42484. Pubescens.
42561. Pubescens.
42581. Pubescens.
45566. Circulare.

DEMAREE, D.

2832. Dilatatum.

DEVORE AND HOOVER

50. Conjugatum.

DEWEY, L. H.

125. Pubescens.
323. Pubescens.

DIDRICHSEN, F.

4384. Vaginatum.
4387. Racemosum.

DOBBIN, FRANK

15. Psammophilum.

DORSETT, P. H.

- 150b. Conjugatum pubescens.
166b. Consersum.
211b. Consersum.
215b. Conjugatum.
265b. Paniculatum.

DORSETT, P. H., AND POPENOE, W.

- 215c. Pilosum.
446b. Conjugatum.

DOWELL, P.

7344. Debile.

DRUMMOND, T.

342. Pubiflorum.
350. Langei.
363. Dissectum.
364. Monostachyum.
441. Distichum.
443. Lentiferum.
446. Ciliatifolium.

DUNLAP, V. C.

199. Fasciculatum.

DUSÉN, P.

130. Paniculatum.
2770. Pectinatum.
2844a. Pectinatum.
3986. Pumilum.
4023. Stellatum.
8011. Stellatum.
10611. Pectinatum.
10834. Lineare.
13256. Pectinatum.
13465. Vaginatum.
13539. Conjugatum.
13625. Paniculatum.
13783. Vaginatum.
13890. Millegiana.
15727. Pectinatum.
16429. Consersum.
16434. Plicatulum.
17864. Notatum.
17984. Pilosum.

DUSS, PÉRE.

- 545 part. Distichum.
545 part. Vaginatum.
548 part. Nesiotes.
548 part. Plicatulum.
549. Paniculatum.
551. Laxum.
558. Notatum.
720. Plicatulum.
1275. Fimbriatum.
1276. Conjugatum.
1317. Saccharoides.
2673. Plicatulum.
2677. Paniculatum.
3366. Saccharoides.
3609. Distichum.
3915. Melanospermum.
4011. Plicatulum.
4012. Melanospermum.
4059. Nutans.
4224. Densum.
4507. Orbiculatum.

DUTRA, J.

503. Notatum.
546. Sanguineolentum.
555. Conjugatum pubescens.
599. Pumilum.
16478. (Mus. Rio Jan.). Urvillei.
16496. (Mus. Rio Jan.). Orbiculatum.

EATON, A. A.

- 69. Ciliatifolium.
- 85. Caespitosum.
- 172. Monostachyum.
- 237. Caespitosum.
- 238. Rigidifolium.
- 246. Blodgettii.
- 269. Caespitosum.
- 481. Caespitosum.
- 483. Ciliatifolium.
- 647. Lentiferum.
- 1207. Ciliatifolium.

EBERHARDT

- 2191. Conjugatum.

EDWALL, G.

- 3035. Pilosum.

EGGERS, H. F. A.

- 4. Plicatulum.
- 676. Millegrana.
- 691. Vaginatulum.
- 795. Paniculatum.
- 1057. Paniculatum.
- 1176. Virgatum.
- 1964. Conjugatum.
- 2439. Pulchellum.
- 2547. Plicatulum.
- 5317. Paniculatum.
- 5553. Virgatum.
- 13090. Fimbriatum.
- 13330. Humboldtianum.
- 14104. Fasciculatum.
- 14602. Vaginatulum.
- 14632. Repens.
- 14646. Conjugatum.
- 14668. Orbiculatum.
- 14965. Racemosum.

EKMAN, E. L.⁸⁰

- 10. Pubiflorum.
- 176. Caespitosum.
- 184. Arundinaceum.
- 184 part. Secans.
- 264. Lindenianum.
- 331. Caespitosum.
- 504. Distichum.
- 568. Malacophyllum.
- 570. Conjugatum.
- 571. Conjugatum.
- 573. Paniculatum.

EKMAN, E. L.—Continued

- 576. Dilatatum.
- 577. Urvillei.
- 578. Notatum.
- 581. Plicatulum.
- 582. Plicatulum.
- 588. Consersum.
- 594 (Cuba). Alterniflorum.
- 594 (Argentina). Stellatum.
- 595. Stellatum.
- 685. Paniculatum.
- 697. Saugetii.
- 798. Bakeri.
- 888. Distichum.
- 938. Pubiflorum.
- 1094. Debile.
- 1251. Notatum.
- 1253. Lividum.
- 1257. Lividum.
- 1284. Rupestre.
- 2756. Distachyon.
- 2890. Caespitosum.
- 3475. Laxum.
- 3597. Distortum.
- 6176. Millegrana.
- 6294. Alterniflorum.
- 6337. Saugetii.
- 7565. Capillifolium.
- 8000. Fimbriatum.
- 9843. Breve.
- 10118. Millegrana.
- 10370. Conjugatum.
- 10737. Lineare.
- 10784. Nanum.
- 10960. Propinquum.
- 11021. Propinquum.
- 11033. Vaginatulum.
- 11085. Densum.
- 11093. Unispicatum.
- 11095. Filiforme.
- 11197. Filiforme.
- 11497. Langei.
- 11652. Propinquum.
- 11715. Pulchellum.
- 11957. Insulare.
- 12040. Plicatulum.
- 12190. Nanum.
- 12219. Rottboellioides.
- 12220. Insulare.
- 12223. Secans.
- 12423. Distachyon.
- 12604. Blodgettii.
- 12838. Bakeri.

⁸⁰ See numbers beginning with H for Haitian collections.

EKMAN, E. L.—Continued

12855. Dilatatum.
 12908. Lindenianum.
 12966. Decumbens.
 12998. Rupestre.
 13018. Paniculatum.
 13052. Notatum.
 13392. Vaginatum.
 14093. Nanum.
 14104. Nanum.
 14146. Lineare.
 14691. Distortum.
 15008. Convexum.
 15335. Virgatum.
 15756. Pleostachyum.
 15806. Orbiculatum.
 16800. Pubiflorum.
 16805. Lividum.
 16819. Rocanum.
 16822. Edmondi.
 16904. Saugetii.
 16906. Breve.
 16982. Clavuliferum.
 16983. Reptatum.
 16990. Serratum.
 17093. Minus.
 17096. Notatum.
 17207. Bakeri.
 17269. Dissectum.
 17565. Amphicarpum.
 17910. Wrightii.
 18115. Multicaule.
 18249. Reptatum.
 18980. Acutifolium.
 19046. Capillifolium.
 H 7. Distortum.
 H 42. Blodgettii.
 H 43. Laxum.
 H 61. Saugetii.
 H 66. Ciliatifolium.
 H 256. Millegrana.
 H 334. Saugetii.
 H 384. Secans.
 H 411. Plicatulum.
 H 449. Breve.
 H 690. Saugetii.
 H 734. Notatum.
 H 861. Millegrana.
 H 863. Notatum.
 H 1017. Caespitosum.
 H 1018. Saugetii.
 H 2045. Lindenianum.
 H 2172. Virgatum.

EKMAN, E. L.—Continued

H 2210. Saugetii.
 H 2274. Heterotrichon.
 H 2302. Stellatum.
 H 2376. Langei.
 H 2401. Heterotrichon.
 H 2435. Arundinaceum.
 H 2484. Stellatum.
 H 2555. Laxum.
 H 2601. Propinquum.
 H 2749. Distachyon.
 H 2756. Vaginatum.
 H 2927. Notatum.
 H 3379. Breve.
 H 3430. Densum.
 H 3483. Decumbens.
 H 3593. Laxum.
 H 3624. Laxum.
 H 3693. Decumbens.
 H 4132. Pleostachyum.
 H 4156. Laxum.
 H 4228. Saugetii.
 H 4501. Propinquum.
 H 4919. Rupestre.
 H 5401. Alterniflorum.
 H 5948. Langei.
 H 6248. Dispar.
 H 6428. Stellatum.
 H 6451. Secans.
 H 6452. Arundinaceum.
 H 7086. Distichum.
 H 7115. Plicatulum.
 H 7246. Stellatum.
 H 7247. Heterotrichon.
 H 7264. Fimbriatum.
 H 8040. Conjugatum.
 H 8043. Laxum.
 H 8129. Paniculatum.
 H 8350. Plicatulum.
 H 8351. Alterniflorum.
 H 8837. Laxum.
 H 9416. Densum.

ELMER, A. D. E.

16497. Conjugatum.
 18184. Conjugatum.

EMRICK, G. M.

48. Conjugatum.
 193. Conjugatum.

EYERDAM, W. J.

357. Breve.

FAIRCHILD, D., AND DORSETT, P. H.

688. *Conjugatum*.

FARIS, J. A.

4. *Caespitosum*.11. *Propinquum*.89. *Saugetii*.101. *Conjugatum*.105. *Laxum*.107. *Saugetii*.109. *Caespitosum*.258. *Distichum*.267. *Millegrana*.329. *Dilatatum*.388. *Distichum*.407. *Virgatum*.414. *Paniculatum*.

FARWELL, O. A.

1435. *Pubescens*.1781. *Pubescens*.

FASSETT, N. C.

5164. *Stramineum*.5165. *Stramineum*.

FASSETT, N. C., AND HOTCHKISS, N.

2894. *Stramineum*.2895. *Stramineum*.2905. *Stramineum*.

FAURIE, U.

4474. *Vaginatium*.

FENDLER, A.

1694. *Trachycoleon*.1697. *Trachycoleon*.1698. *Heterotrichon*.1699. *Humboldtianum*.1713. *Fimbriatum*.1714. *Paniculatum*.1725. *Conjugatum*.1737. *Plicatulum*.1738. *Microstachyum*.2533. *Stellatum*.2535. *Decumbens*.2536. *Orbiculatum*.FERNALD, M. L., HUNNEWELL, F. W.,
AND LONG, B.8499. *Pubescens*.8505. *Pubescens*.

FERNALD, M. L., AND LONG, B.

8498. *Psammophilum*.17891. *Pubescens*.FERNALD, M. L., LONG, B., AND
TORREY G. S.8502. *Pubescens*.

FERNÁNDEZ, C.

24382 (BS). *Conjugatum*.

FERNANDO, H.

36. *Alterniflorum*.430. *Paniculatum*.

FERRIS, R. S.

5464. *Longicuspe*.

FIEBRIG, K.

664. *Stellatum*.876. *Plicatulum*.4652. *Conjugatum*.4696. *Conjugatum*.4996. *Lineare*.5180. *Malacophyllum*.5190. *Plicatulum*.

FINCK, HUGO

7. *Virgatum*.17½. *Paniculatum*.

FINLAY, K.

39. *Decumbens*.

FIRMIN, BROTHER G.

255. *Humboldtianum*.562. *Humboldtianum*.

FISCHER, WALTER

257. *Distichum*.

FISHER, G. L.

34. *Stramineum*.54. *Virgatum*.63. *Virgatum*.65. *Plicatulum*.79. *Lividum*.84. *Plicatulum*.87. *Dilatatum*.110. *Floridanum*.116. *Langei*.200. *Repens*.

FISHER, G. L.—Continued

251. *Monostachyum*.
 257. *Floridanum*
 260. *Langei*.
 2012. *Langei*.
 2089. *Repens*.
 5067. *Urvillei*.

FISHLOCK, W. C.

108. *Laxum*.
 436. *Distichum*.

FORBES, C. N.

325. *Dilatatum*.
 737. *Dilatatum*.

FRANCIS, M. E.

3. *Giganteum*.
 4. *Monostachyum*.
 5. *Conjugatum*.

FREDHOLM, A.

135. *Ciliatifolium*.
 155. *Floridanum glabratum*.
 3284. *Fimbriatum*.
 3299. *Virgatum*.
 3306. *Conjugatum*.
 5232. *Praecox*.
 5232a. *Lentiferum*.
 5743. *Longepedunculatum*.
 5915. *Debile*.
 5950. *Lentiferum*.
 6056. *Lentiferum*.
 6150. *Lentiferum*.
 6356. *Conjugatum*.
 6363. *Dilatatum*.
 6366. *Supinum*.
 6380. *Distichum*.
 6383. *Ciliatifolium*.
 6387. *Pubescens*.
 6399. *Laeve*.
 6470. *Vaginatum*.
 6473. *Conjugatum*.

FREEMAN, W. G.

5022. *Fimbriatum*.
 5026. *Laxum*.

FRIEDRICHSTHAL, E.

183. *Laxum*.

FRIES, R. E.

1064. *Distichum*.

24483—29—18

FUENTES, M.

1846. *Plicatulum*.

FUNCK, N., AND SCHLIM, L. J.

823. *Plicatulum*.

GARBER, A. P.

224. *Monostachyum*.

GARCÍA, P. I.

644. *Convexum*.
 786. *Convexum*.

GARDNER, G.

208. *Conjugatum*.
 1187. *Vaginatum*.
 2347. *Malacophyllum*.
 3496. *Pilosum*.
 3501. *Paniculatum*.
 3504. *Virgatum*.
 3507. *Gardnerianum*.
 3542. *Sanguineolentum*.
 4030. *Stellatum*.
 4031. *Malacophyllum*.
 4032. *Microstachyum*.
 4043. *Malacophyllum*.
 4047. *Gardnerianum*.
 4390. *Trachycoleon*.

GATTINGER, A.

3570. *Circulare*.

GAUMER, G. F.

852. *Yucatanum*.
 2464. *Yucatanum*.

GEOGRAPHICAL SOCIETY OF BALTIMORE

197. *Laxum*.
 267. *Laxum*.
 479. *Distichum*.
 546. *Vaginatum*.

GERDES, E.

64. *Paniculatum*.

GERVAIS, BROTHER

163. *Plicatulum*.

GLASGOW, C. A.

3. *Conjugatum*.
 9. *Distichum*.

GLAZIOU, A.

- 470. Urvillei.
- 476. Millegrana.
- 477. Urvillei.
- 4307. Pumilum.
- 4315. Conjugatum pubescens.
- 4316. Conjugatum pubescens.
- 4345. Millegrana.
- 6957. Conjugatum.
- 9055. Conjugatum.
- 13328. Coryphaeum.
- 15633. Lineare.
- 17353. Paniculatum.
- 17366. Conjugatum
- 17375. Lineare.
- 17414. Stellatum.
- 17909. Pilosum.
- 18684. Coryphaeum.
- 20085. Stellatum.
- 20122. Vaginatum.
- 20561a. Urvillei.
- 22426. Pectinatum.
- 22427. Pectinatum.
- 22429. Pectinatum.
- 22466a. Gardnerianum.
- 22474. Lineare.
- 22476. Lineare.
- 22489. Sanguineolentum.
- 22493. Lineare.
- 22545. Stellatum.
- 22548. Stellatum.
- 22550. Stellatum.
- 22553 part. Stellatum.
- 22576. Heterotrichon.
- 22577. Trachycoleon.
- 22579. Pilosum.
- 22586. Gardnerianum.
- 22590. Plicatulum.
- 22595. Gardnerianum.
- 22597. Pictum.
- 22600. Gardnerianum.
- 22601. Gardnerianum.
- 22602. Gardnerianum.
- 22605a. Coryphaeum.
- 22607. Virgatum.

GLEASON, H. A.

- 24. Melanospermum.
- 34. Virgatum.
- 635. Melanospermum.
- 649. Virgatum.
- 2198. Repens.
- 3673. Conjugatum.
- 3868. Decumbens.

GOELDI, ANDRÉ

- 1. Densum.
- 10. Millegrana.
- 13. Multicaule.
- 14. Millegrana.
- 21. Paniculatum.
- 28. Melanospermum.
- 29. Decumbens.
- 33. Conjugatum.
- 40. Nutans.
- 48. Acutum.
- 73. Conjugatum.
- 85. Orbiculatum.
- 86. Densum.
- 95. Parviflorum.
- 114. Fasciculatum.
- 115. Fasciculatum.
- 120. Repens.
- 129. Acutum.
- 131. Dilatatum.
- 161. Plicatulum.
- 181. Pulchellum.
- 183. Multicaule.
- 184. Virgatum.
- 191. Virgatum.
- 194. Pulchellum.
- 195. Pulchellum.
- 199. Virgatum.
- 201. Coryphaeum.
- 204. Dilatatum.
- 206. Plicatulum.
- 207. Orbiculatum.
- 211. Millegrana.
- 212. Densum.
- 213. Millegrana.
- 249. Conjugatum.
- 259. Urvillei.
- 264. Densum.
- 288. Melanospermum.
- 290. Boscianum.
- 293. Melanospermum.
- 304. Multicaule.
- 310. Paniculatum.

GOLL, P. P.

- 78. Microstachyum.
- 79. Paniculatum.
- 80. Botterii.
- 81. Plicatulum.
- 235. Plicatulum.
- 923. Millegrana.

GOSSWEILER, JOHN

- 9068. Conjugatum.

GOUIN, DOCTOR

27. Propinquum.

GOULARD

14. Vaginatum.

GRANT, G. B.

1196. Distichum.

GRAVES, C. B.

240. Psammophilum.

241. Pubescens.

245. Pubescens.

246. Pubescens.

255. Psammophilum.

GREENMAN, J. M.

4297. Circulare.

4387. Distichum.

GRIFFITHS, DAVID

1610. Distichum.

4719. Distichum.

5649. Stramineum.

5684. Stramineum.

5734. Stramineum.

6015. Distichum.

6383. Debile.

6431. Debile.

6447. Debile.

6467. Distichum.

6805. Stramineum.

GRIMES, E. J.

869. Pubescens.

907. Pubescens.

3022. Pubescens.

3218. Floridanum.

3715. Dilatatum.

4148. Laeve.

4167. Floridanum.

4336. Dilatatum.

4480. Pubescens.

GRISOL

24. Repens.

GUNTHER, E.

7. Dilatatum.

33. Candidum.

HAHN, L.

1060. Virgatum.

HALE, JOSIAH

25. Pubiflorum glabrum.

HALL, ELIHU

801. Plicatulum.

802. Stramineum.

803. Langei.

804. Pubiflorum.

805. Praecox.

806. Lentiferum.

807. Lividum.

808. Distichum.

809. Laeve.

810. Circulare.

811. Floridanum glabratum.

HANSON, H. C.

499. Langei.

HARGER, E. B.

5741. Pubescens.

HARMAND

859. Conjugatum.

HARPER, R. M.

114. Longipilum.

116. Repens.

351. Boscianum.

367. Boscianum.

368. Dilatatum.

383. Distichum.

477. Floridanum.

623. Floridanum glabratum.

632. Bifidum.

672. Lentiferum.

900. Lentiferum.

1249. Bifidum.

1335. Lentiferum.

1486. Lentiferum.

1629. Lentiferum.

1904. Laeve.

HARRIS, WILLIAM

9497. Notatum.

9674. Saugetii.

11149. Densum.

11267. Fimbriatum.

11278. Paniculatum.

11284. Plicatulum.

11287. Paniculatum.

11289. Plicatulum.

11308. Conjugatum.

HARRIS, WILLIAM—Continued

11353. Plicatulum.
 11379. Paniculatum.
 11408. Caespitosum.
 11448. Conjugatum.
 11522. Decumbens.
 11534. Paniculatum.
 11544. Notatum.
 11545. Decumbens.
 11561. Paniculatum.
 11570. Notatum.
 11606. Decumbens.
 11615. Plicatulum.
 11616. Paniculatum.
 11640. Conjugatum.
 11641. Repens.
 11645. Distichum.
 11695. Distachyon.
 11812. Repens.
 11847. Fimbriatum.
 11850. Distichum.
 12214. Densum.
 12255. Decumbens.
 12282. Conjugatum.
 12317. Caespitosum.
 12443. Notatum.
 12469a. Arundinaceum.
 12528. Distichum.
 12534. Millegrana.
 12544. Arundinaceum.
 12546. Blodgettii.
 12548. Distachyon.
 12551. Lindenianum.
 12557. Repens.
 12559. Lindenianum.
 12560. Blodgettii.
 12564. Distortum.
 12568. Distichum.
 12569. Distortum.
 12582. Serratum.
 12598. Serratum.
 12602. Virgatum.
 12608. Plicatulum.
 12610. Paniculatum.
 12611. Conjugatum.
 12620. Blodgettii.
 12620a. Saugetii.
 12657. Millegrana.
 12658. Millegrana.
 12660. Millegrana.
 12660a. Virgatum.
 12661. Vaginatum.
 12681. Plicatulum.

HARRIS, WILLIAM—Continued

12695. Plicatulum.
 12699. Caespitosum.
 12701. Plicatulum.
 12703. Blodgettii.
 12708. Dilatatum.
 12716. Distachyon.
 12717. Reptatum.
 12719. Serratum.
 12726. Caespitosum.
 12730. Millegrana.
 12748. Caespitosum.
 12758. Caespitosum.
 12897. Virgatum.
 22584. Fimbriatum.

HART, J.

65. Paniculatum.
 81. Conjugatum pubescens.
 88. Paniculatum.
 92. Orbiculatum.
 180. Decumbens.
 567. Fimbriatum.
 677. Paniculatum.
 679. Plicatulum.
 687. Fimbriatum.
 729. Virgatum.
 745. Paniculatum.
 755. Conjugatum.
 860. Vaginatum.
 865. Distichum.
 2155. Densum.
 4194. Repens.

HARTEMAN, BROTHER

16. Lividum.
 65. Humboldtianum.

HARTMAN, C. V.

659. Distichum.

HARVEY, F. L.

17. Floridanum.
 18. Floridanum.

HASSLER, E.⁸⁷

8079. Plicatulum.
 9902. Urvillei.
 10015. Conjugatum.
 10090. Gardnerianum.
 10134. Paniculatum.
 10738. Paniculatum.

⁸⁷ Some of the Hassler collections were made by T. Rojas.

HASSLER, E.—Continued

10775. Lineare.
 10784. Acuminatum.
 11058. Stellatum.
 11639. Lineare.
 11649. Paniculatum.
 11904. Gardnerianum.
 11916. Urvillei.
 11930. Acuminatum.
 12088. Conjugatum.
 12452. Distichum.
 12471. Acuminatum.
 12546. Minus.
 13033. Minus.

HASTINGS, G. T.

316. Distichum.

HAUGHT, O.

108. Racemosum.

HAYES, SUTTON

219. Saccharoides.

HEILBORN, O.

39. Candidum.

HELLER, A. A.

10. Laxum.
 164. Laxum.
 524. Molle.
 625. Virgatum.
 664. Orbiculatum.
 701. Circulare.
 764. Pubescens.
 1373. Virgatum.
 1546. Ciliatifolium.
 1699. Pubiflorum.
 1872. Pubiflorum.
 1975. Conjugatum.
 4193. Circulare.
 4194. Floridanum.
 4234. Circulare.
 4244. Pubescens.
 4368. Millegrana.
 4397. Conjugatum.
 4399. Paniculatum.
 6219. Fimbriatum.
 6227. Paniculatum.
 6354. Decumbens.
 14028. Setaceum.
 14117. Floridanum.

HENDERSON, M. R.

17944. Conjugatum.

HENRY, A.

1036. Vaginatum.

HENSCHEN, S. E.

- III. 1343xxx. Plicatulum.

- III. 1345x. Trachycoleon.

HERIBERTO, BROTHER

192. Microstachyum.

HERTER, W.

327. Notatum.

334. Dilatatum.

336. Vaginatum.

HERTER, W., HERB. OSTEN.

18621. Distichum.

- 18622a part. Plicatulum.

18623. Notatum.

18784. Dilatatum.

18814. Notatum.

18815. Notatum.

18826. Distichum.

HERZOG, T.

1345. Plicatulum.

1756. Malacophyllum.

1836. Malacophyllum.

HESS, W. E.

425. Laxum.

434. Laxum.

435. Caespitosum.

436. Caespitosum.

439. Vaginatum.

HEYDE, E. T.

734. Notatum.

HEYDE, E. T. AND LUX, E. (DIST. SMITH).

3558. Paniculatum.

3898. Virgatum.

3902. Conjugatum.

3903. Scabrum.

3910. Notatum.

4101. Plicatulum.

4298. Cymbiforme.

4300. Candidum.

6271. Humboldtianum.

6402. Virgatum.

6403. Plicatulum.

HILL, E. J.

201. Stramineum.

HILLEBRAND, W.

492. Conjugatum.

HIORAM, BROTHER

12. Distachyon.

111. Laxum.

320. Plicatulum.

347. Notatum.

358. Fimbriatum.

367. Boscianum.

804. Laxum.

807. Notatum.

2633. Saugetii.

2717. Laxum.

HIORAM AND BAPTISTE, BROTHERS

1289. Distachyon.

HITCHCOCK, A. S.

18. Distichum.

29. Floridanum.

206. Longepedunculatum.

206½. Ciliatifolium.

224. Praecox.

297. Dilatatum.

298. Pubescens.

299. Pubescens.

300. Setaceum.

312. Supinum.

400. Distichum.

454. Notatum.

455. Minus.

456. Plicatulum.

457. Plicatulum.

458. Saugetii.

459. Saugetii.

461. Saugetii.

462. Nanum.

463. Lindenianum.

464. Caespitosum.

465. Caespitosum.

466. Caespitosum.

467. Caespitosum.

468. Virgatum.

469. Pulchellum.

470. Blodgettii.

471. Debile.

472. Multicaule.

473. Conjugatum.

HITCHCOCK, A. S.—Continued

474. Conjugatum.

475. Bakeri.

477. Arundinaceum.

478. Arundinaceum.

499. Giganteum.

500. Lentiferum.

501. Laeve.

505. Vaginatum.

506. Distichum.

507. Ciliatifolium.

508. Longepedunculatum.

509. Debile.

607. Blodgettii.

607½. Caespitosum.

626. Blodgettii.

628. Ciliatifolium.

631. Ciliatifolium.

637. Caespitosum.

643. Rigidifolium.

684. Rigidifolium.

688. Longepedunculatum.

689. Blodgettii.

742. Ciliatifolium.

753. Debile.

753½. Longepedunculatum.

816. Ciliatifolium.

832. Ciliatifolium.

854. Debile.

857. Propinquum.

862. Longepedunculatum.

872. Circulare.

873. Floridanum glabratum.

948. Conjugatum.

1188. Longipilum.

1196. Plicatulum.

2340. Pubescens.

2341. Pubescens.

2342. Pubescens.

2343. Pubescens.

2381. Stramineum.

2417. Pubescens.

2419. Hartwegianum.

2420. Longepedunculatum.

2421. Longepedunculatum.

2422. Longepedunculatum.

2423. Longepedunculatum.

2424. Setaceum.

2425. Setaceum.

2426. Setaceum.

2427. Setaceum.

2428. Setaceum.

HITCHCOCK, A. S.—Continued

2429. Debile.
 2430. Debile.
 2431. Distichum.
 2432. Distichum.
 2433. Supinum.
 2434. Supinum.
 2435. Supinum.
 2436. Supinum.
 2437. Stramineum.
 2438. Stramineum.
 2439. Pubescens.
 2444. Pubescens.
 2445. Pubescens.
 2446. Pubescens.
 2447. Rigidifolium.
 2448. Ciliatifolium.
 2449. Ciliatifolium.
 2450. Ciliatifolium.
 2451. Ciliatifolium.
 2452. Ciliatifolium.
 2453. Ciliatifolium.
 2454. Ciliatifolium.
 2455. Ciliatifolium.
 2456. Ciliatifolium.
 2457. Ciliatifolium.
 2458. Propinquum.
 2459. Monostachyum.
 2460. Monostachyum.
 2461. Langei.
 2462. Blodgettii.
 2463. Caespitosum.
 2464. Caespitosum.
 2465. Vaginatum.
 2466. Vaginatum.
 2467. Vaginatum.
 2467. Fl. Pl.⁸⁸ Distichum.
 2468. Pubiflorum.
 2468. Fl. Pl. Distichum.
 2469. Pubiflorum.
 2469. Fl. Pl. Distichum.
 2470. Supinum.
 2471. Ciliatifolium.
 2473. Ciliatifolium.
 2474. Ciliatifolium.
 2475. Ciliatifolium.
 2476. Ciliatifolium.
 2477. Ciliatifolium.
 2479. Ciliatifolium.
 2481. Supinum.
 2482. Supinum.
 2483. Supinum.
 2484. Supinum.
 2485. Supinum.

HITCHCOCK, A. S.—Continued

2486. Setaceum.
 2488. Setaceum.
 2489. Rigidifolium.
 2491. Setaceum.
 2492. Longepedunculatum.
 2493. Longepedunculatum.
 2495. Boscianum.
 2496. Plicatulum.
 2497. Plicatulum.
 2498. Lentiferum.
 2499. Laeve.
 2500. Praecox.
 2501. Plicatulum.
 2502. Blodgettii.
 2503. Caespitosum.
 2504. Longipilum.
 2505. Lentiferum.
 2506. Laeve.
 2507. Longipilum.
 2508. Floridanum.
 2534. Stramineum.
 3211. Distichum.
 3474. Dilatatum.
 3518. Distichum.
 3575. Distichum.
 3600. Pubiflorum.
 3601. Lentiginosum.
 3615. Paucispicatum.
 3616. Distichum.
 3621. Lentiginosum.
 3622. Hartwegianum.
 3623. Pubiflorum.
 3676. Distichum.
 3677. Distichum.
 3687. Distichum.
 3821. Distichum.
 3867. Lividum.
 3868. Dilatatum.
 3869. Dilatatum.
 3870. Dilatatum.
 3871. Dilatatum.
 3872. Urvillei.
 3873. Urvillei.
 3874. Urvillei.
 3875. Urvillei.
 3876. Laeve.
 3877. Laeve.
 3878. Laeve.
 3879. Laeve.
 3880. Laeve.
 3881. Laeve.
 3882. Longipilum.
 3883. Longipilum.

⁸⁸Early series of Florida plants numbered separately.

HITCHCOCK, A. S.—Continued

3884. Longipilum.
 3885. Longipilum.
 3886. Longipilum.
 3887. Longipilum.
 3888. Longipilum.
 3889. Longipilum.
 3890. Circulare.
 3891. Circulare.
 3892. Lentiferum.
 3893. Lentiferum.
 3894. Lentiferum.
 3895. Difforme.
 3896. Difforme.
 3897. Floridanum.
 3898. Floridanum.
 3899. Floridanum glabratum.
 3900. Repens.
 3901. Distichum.
 3902. Distichum.
 3903. Distichum.
 3904. Pubiflorum.
 5142. Distichum.
 5146. Pubiflorum.
 5192. Urvillei.
 5198. Pubiflorum.
 5251. Langei.
 5254. Pubiflorum.
 5260. Pubiflorum.
 5296. Pubiflorum.
 5301. Distichum.
 5326. Plicatulum.
 5327. Urvillei.
 5362. Distichum.
 5378. Hartwegianum.
 5407. Lividum.
 5408. Conjugatum.
 5414. Virgatum.
 5434. Monostachyum.
 5442. Debile.
 5464. Distichum.
 5480. Distichum.
 5488. Stramineum.
 5522. Paucispicatum.
 5549. Pubiflorum.
 5552. Paucispicatum.
 5555. Pubiflorum.
 5561. Unispicatum.
 5562. Langei.
 5563. Pubiflorum.
 5564. Hartwegianum.
 5565. Lividum.
 5572. Pubiflorum.

HITCHCOCK, A. S.—Continued

5573. Langei.
 5575. Paucispicatum.
 5587. Distichum.
 5588. Distichum.
 5590. Pubiflorum.
 5602. Distichum.
 5608. Pubiflorum.
 5683. Distichum.
 5723. Humboldtianum.
 5727. Notatum.
 5730½. Mutabile.
 5735. Pubiflorum.
 5736. Mutabile.
 5740. Lividum.
 5743. Distichum.
 5743½. Alcalinum.
 5748. Distichum.
 5748½. Hartwegianum.
 5760. Botterii.
 5764. Plicatulum.
 5765. Notatum.
 5773. Mutabile.
 5773½. Plicatulum.
 5776. Humboldtianum.
 5778. Notatum.
 5785. Vaginatum.
 5793. Setaceum.
 5811. Pubiflorum.
 5815. Distichum.
 5817. Lividum.
 5837. Distichum.
 5869. Lividum.
 5884. Distichum.
 5955. Tenellum.
 6044. Distichum.
 6059. Pubiflorum.
 6066. Distichum.
 6098. Unispicatum.
 6099. Unispicatum.
 6109. Notatum.
 6130. Hartwegianum.
 6133. Humboldtianum.
 6152. Lividum.
 6153. Botterii.
 6168. Paucispicatum.
 6173. Distichum.
 6177. Hartwegianum.
 6182. Botterii.
 6185. Botterii.
 6188. Virgatum.
 6189. Hartwegianum.
 6190. Hartwegianum.

HITCHCOCK, A. S.—Continued

6208. Lividum.
 6209. Botterii.
 6222. Conjugatum.
 6225. Distichum.
 6245. Notatum.
 6287. Squamulatum.
 6291. Distichum.
 6312. Distichum.
 6313. Lividum.
 6314. Distichum.
 6318. Conjugatum pubescens.
 6322. Notatum.
 6323. Variabile.
 6328. Botterii.
 6346. Paniculatum.
 6347. Botterii.
 6355. Humboldtianum.
 6358. Plicatulum.
 6371. Plicatulum.
 6374. Paniculatum.
 6377. Botterii.
 6397. Paniculatum.
 6400. Distichum.
 6407. Conjugatum.
 6409. Plicatulum.
 6411. Variabile.
 6413. Virgatum.
 6414. Plicatulum.
 6416. Botterii.
 6417. Langei.
 6428. Fasciculatum.
 6430. Notatum.
 6434. Virgatum.
 6439. Variabile.
 6451. Lividum.
 6549. Propinquum.
 6561. Distichum.
 6565. Notatum.
 6568. Vaginatum.
 6577. Notatum.
 6590. Minus.
 6591. Notatum.
 6603. Botterii.
 6608. Variabile.
 6609. Conjugatum.
 6613. Affine.
 6614. Plicatulum.
 6617. Affine.
 6620. Lividum.
 6638. Squamulatum.
 6643. Plenum.
 6644. Variabile.

HITCHCOCK, A. S.—Continued

6644½. Langei.
 6645. Variabile.
 6647. Distichum.
 6652. Distichum.
 6654. Squamulatum.
 6657. Convexum.
 6668. Convexum.
 6679. Humboldtianum.
 6684. Plenum.
 6686. Pubiflorum.
 6692. Convexum.
 6768. Distichum.
 6818. Conjugatum.
 6823. Lividum.
 6826. Botterii.
 6830. Convexum.
 6833. Variabile.
 6837. Humboldtianum.
 6838. Notatum.
 6844. Distichum.
 6854. Plicatulum.
 6863. Convexum.
 6868. Convexum.
 6874. Lentiginosum.
 6879. Hartwegianum.
 6880. Lividum.
 6881. Lividum.
 6882. Tinctum.
 6882½. Plicatulum.
 6883. Tenellum.
 6910. Distichum.
 6922. Tenellum.
 6933. Lividum.
 6938. Hartwegianum.
 6944. Distichum.
 6948. Pubiflorum.
 6950. Pubiflorum.
 6955. Tenellum.
 6957. Convexum.
 6958. Convexum.
 6961. Squamulatum.
 6962. Notatum.
 6978. Squamulatum.
 6980. Humboldtianum.
 6984. Notatum.
 6992. Lividum.
 6993. Convexum.
 6994. Convexum.
 6996. Notatum.
 6999. Convexum.
 7005. Convexum.
 7030. Conjugatum.

HITCHCOCK, A. S.—Continued

7036. *Paniculatum*.
 7055. *Humboldtianum*.
 7057. *Plicatulum*.
 7059. *Plicatulum*.
 7064. *Convexum*.
 7065. *Clavuliferum*.
 7074. *Botterii*.
 7078. *Erectum*.
 7093. *Crassum*.
 7098. *Lentiginosum*.
 7120. *Convexum*.
 7121. *Tenellum*.
 7127. *Distichum*.
 7133. *Tenellum*.
 7134. *Convexum*.
 7141. *Notatum*.
 7147. *Lividum*.
 7153. *Jaliscanum*.
 7176. *Humboldtianum*.
 7181. *Arsenei*.
 7182. *Arsenei*.
 7183. *Notatum*.
 7190. *Convexum*.
 7196. *Pubiflorum*.
 7197. *Lividum*.
 7208. *Tenellum*.
 7220. *Pubiflorum*.
 7221. *Convexum*.
 7222. *Convexum*.
 7223. *Convexum*.
 7229. *Conspersum*.
 7230. *Pubiflorum*.
 7240. *Jaliscanum*.
 7246. *Squamulatum*.
 7281. *Notatum*.
 7284. *Convexum*.
 7290. *Convexum*.
 7297. *Humboldtianum*.
 7311. *Distichum*.
 7316. *Paniculatum*.
 7318. *Lividum*.
 7363. *Virgatum*.
 7378. *Distichum*.
 7382. *Crinitum*.
 7386. *Longicuspe*.
 7388. *Lividum*.
 7400. *Hartwegianum*.
 7404. *Tinctum*.
 7409. *Lividum*.
 7414. *Pubiflorum*.
 7415. *Distichum*.
 7481. *Distichum*.

HITCHCOCK, A. S.—Continued

7487. *Distichum*.
 7528. *Distichum*.
 7561. *Distichum*.
 7568. *Distichum*.
 7578. *Pubiflorum*.
 7592. *Convexum*.
 7735. *Paucispicatum*.
 7858. *Pubescens*.
 7863. *Longipilum*.
 7899. *Fasciculatum*.
 7902. *Plicatulum*.
 7903. *Virgatum*.
 7904. *Saccharoides*.
 7907. *Paniculatum*.
 7909. *Conjugatum*.
 7939. *Decumbens*.
 7960. *Decumbens*.
 7962. *Decumbens*.
 7966. *Orbiculatum*.
 7969. *Plicatulum*.
 7973. *Minus*.
 7978. *Minus*.
 7981. *Plicatulum*.
 7985. *Centrale*.
 7988. *Pilosum*.
 7990. *Decumbens*.
 7991. *Plicatulum*.
 7995. *Plicatulum*.
 7996. *Vaginatum*.
 7998. *Notatum*.
 8004. *Centrale*.
 8005. *Centrale*.
 8008. *Centrale*.
 8009. *Notatum*.
 8010. *Plicatulum*.
 8011. *Microstachyum*.
 8017. *Subciliatum*.
 8020. *Densum*.
 8024. *Plicatulum*.
 8025. *Microstachyum*.
 8031. *Repens*.
 8034. *Vaginatum*.
 8042. *Vaginatum*.
 8045. *Saccharoides*.
 8047. *Nutans*.
 8055. *Paniculatum*.
 8059. *Centrale*.
 8069. *Microstachyum*.
 8071. *Paniculatum*.
 8082. *Virgatum*.
 8088. *Decumbens*.
 8096. *Pectinatum*.

HITCHCOCK, A. S.—Continued

8099. Propinquum.
 8114. Fasciculatum.
 8115. Decumbens.
 8123. Minus.
 8124. Plicatulum.
 8130. Pilosum.
 8136. Notatum.
 8138. Plicatulum.
 8141. Decumbens.
 8151. Microstachyum.
 8165. Propinquum.
 8169. Gardnerianum.
 8177. Plicatulum.
 8186. Humboldtianum.
 8190. Plicatulum.
 8192. Pilosum.
 8193. Conjugatum.
 8230. Nutans.
 8234. Minus.
 8235. Heterotrichon.
 8272. Paniculatum.
 8292. Plicatulum.
 8293. Plicatulum.
 8297. Heterotrichon.
 8298. Pilosum.
 8332. Convexum.
 8339. Subciliatum.
 8339½. Plicatulum.
 8345. Centrale.
 8348. Microstachyum.
 8349. Paniculatum.
 8359. Boscianum.
 8361. Decumbens.
 8365. Pilosum.
 8367. Notatum.
 8369. Convexum.
 8389. Orbiculatum.
 8403. Vaginatum.
 8416. Paniculatum.
 8418. Vaginatum.
 8424. Fasciculatum.
 8425. Plicatulum.
 8431. Decumbens.
 8432. Orbiculatum.
 8438. Saccharoides.
 8454. Notatum.
 8462. Pilosum.
 8464. Fasciculatum.
 8466. Plicatulum.
 8467. Virgatum.
 8468. Paniculatum.
 8472. Nutans.

HITCHCOCK, A. S.—Continued

8474. Convexum.
 8477. Candidum.
 8489. Costaricense.
 8495. Distichum.
 8497. Minus.
 8510. Plicatulum.
 8522½. Convexum.
 8523. Microstachyum.
 8524. Convexum.
 8524½. Centrale.
 8532. Centrale.
 8543. Centrale.
 8544. Centrale.
 8554. Microstachyum.
 8559. Paniculatum.
 8569. Centrale.
 8576. Fasciculatum.
 8579. Virgatum.
 8582. Repens.
 8583. Minus.
 8587. Propinquum.
 8594. Paniculatum.
 8602. Microstachyum.
 8603. Vaginatum.
 8606. Langei.
 8613. Paniculatum.
 8615. Notatum.
 8630. Langei.
 8639. Virgatum.
 8642. Plicatulum.
 8650. Microstachyum.
 8658. Notatum.
 8659. Convexum.
 8681. Langei.
 8684. Propinquum.
 8686. Langei.
 8691. Plicatulum.
 8696. Plicatulum.
 8697. Humboldtianum.
 8703. Convexum.
 8714. Microstachyum.
 8724. Langei.
 8744. Langei.
 8754. Centrale.
 8761. Propinquum.
 8780. Vaginatum.
 8788. Centrale.
 8789. Centrale.
 8854. Propinquum.
 8895. Humboldtianum.
 8918. Repens.
 8931. Convexum.

HITCHCOCK, A. S.—Continued

- 8934. Tenellum.
- 8935. Tenellum.
- 8936. Nutans.
- 8937. Candidum.
- 8946. Trachycoleon.
- 8953. Convexum.
- 8956. Langei.
- 8957. Costaricense.
- 8958. Tenellum.
- 8959. Costaricense.
- 8960. Propinquum.
- 8966. Fasciculatum.
- 8980. Microstachyum.
- 8992. Centrale.
- 9000. Virgatum.
- 9006. Conjugatum.
- 9015. Plicatum.
- 9017. Convexum.
- 9020. Notatum.
- 9033. Humboldtianum.
- 9033½. Cymbiforme.
- 9055. Squamulatum.
- 9078. Botterii.
- 9079. Adoperiens.
- 9093. Tenellum.
- 9094. Lentiginosum.
- 9095. Convexum.
- 9099. Tenellum.
- 9144. Candidum.
- 9148. Urvillei.
- 9150. Fasciculatum.
- 9154. Affine.
- 9157. Decumbens.
- 9161. Minus.
- 9179. Repens.
- 9188. Multicaule.
- 9197½. Multicaule.
- 9213. Floridanum glabratum.
- 9214. Floridanum glabratum.
- 9215. Giganteum.
- 9216. Plicatum.
- 9217. Giganteum.
- 9218. Plicatum.
- 9219. Plicatum.
- 9220. Plicatum.
- 9222. Boscianum.
- 9223. Boscianum.
- 9224. Boscianum.
- 9225. Boscianum.
- 9226. Boscianum.
- 9227. Boscianum.
- 9228. Bifidum.

HITCHCOCK, A. S.—Continued

- 9235. Bifidum.
- 9260. Conjugatum.
- 9275. Saugetii.
- 9287. Distichum.
- 9290½. Plicatum.
- 9294. Lindenianum.
- 9319. Plicatum.
- 9334. Paniculatum.
- 9347. Virgatum.
- 9359. Paniculatum.
- 9389. Distichum.
- 9392. Plicatum.
- 9394. Distichum.
- 9395. Notatum.
- 9400. Virgatum.
- 9405. Virgatum.
- 9416. Paniculatum.
- 9417. Blodgettii.
- 9422. Fimbriatum.
- 9433. Conjugatum.
- 9438. Lindenianum.
- 9438½. Distortum.
- 9439. Fimbriatum.
- 9442. Saugetii.
- 9443. Plicatum.
- 9445. Virgatum.
- 9454. Distichum.
- 9457. Arundinaceum.
- 9464. Blodgettii.
- 9465. Saugetii.
- 9470. Blodgettii.
- 9471. Notatum.
- 9476. Blodgettii.
- 9480. Blodgettii.
- 9482. Saugetii.
- 9483. Fimbriatum.
- 9494. Paniculatum.
- 9495. Notatum.
- 9516. Saugetii.
- 9518. Distortum.
- 9520. Propinquum.
- 9524. Plicatum.
- 9529. Virgatum.
- 9533. Saugetii.
- 9536. Arundinaceum.
- 9540. Notatum.
- 9540½. Minus.
- 9544. Distortum.
- 9549. Plicatum.
- 9555. Virgatum.
- 9557. Millegrana.
- 9562. Decumbens.

HITCHCOCK, A. S.—Continued

9582. Repens.
 9593. Distichum.
 9598. Propinquum.
 9599. Saugetii.
 9599½. Blodgettii.
 9601. Plicatulum.
 9602. Paniculatum.
 9603. Virgatum.
 9624. Blodgettii.
 9625. Fimbriatum.
 9629. Conjugatum.
 9641. Vaginatum.
 9642. Distachyon.
 9644. Arundinaceum.
 9649. Secans.
 9654. Propinquum.
 9655. Virgatum.
 9657. Densum.
 9663. Lindenianum.
 9667. Vaginatum.
 9668. Blodgettii.
 9670. Secans.
 9674. Laxum.
 9678. Distachyon.
 9688. Conjugatum.
 9691. Fimbriatum.
 9696. Notatum.
 9711. Notatum.
 9765. Saugetii.
 9766. Blodgettii.
 9773. Fimbriatum.
 9775. Vaginatum.
 9776. Millegrana.
 9784. Notatum.
 9788. Plicatulum.
 9789. Distortum.
 9790. Paniculatum.
 9791. Virgatum.
 9792. Fimbriatum.
 9795. Serratum.
 9797. Conjugatum.
 9816. Blodgettii.
 9821. Notatum.
 9832. Saugetii.
 9833. Blodgettii.
 9840. Fimbriatum.
 9843. Plicatulum.
 9864. Distachyon.
 9866. Vaginatum.
 9869. Millegrana.
 9873. Lindenianum.
 9874. Blodgettii.

HITCHCOCK, A. S.—Continued

9885. Filiforme.
 9914. Hitchcockii.
 9924. Vaginatum.
 9930. Plicatulum.
 9952. Conjugatum.
 9957. Nutans.
 9957½. Decumbens.
 9960. Paniculatum.
 9982. Nutans.
 9983. Plicatulum.
 9987. Pilosum.
 9993. Paniculatum.
 9997. Virgatum.
 10011. Fimbriatum.
 10015. Nutans.
 10025. Densum.
 10029. Fasciculatum.
 10030. Virgatum.
 10036. Paniculatum.
 10040. Nutans.
 10050. Vaginatum.
 10066. Pulchellum.
 10073. Virgatum.
 10075. Pilosum.
 10086. Distichum.
 10088. Pilosum.
 10090. Plicatulum.
 10092. Coryphaeum.
 10107. Coryphaeum.
 10108. Vaginatum.
 10112. Plicatulum.
 10115. Densum.
 10118. Virgatum.
 10134. Saccharoides.
 10135. Decumbens.
 10139. Vaginatum.
 10145. Millegrana.
 10156. Millegrana.
 10175. Decumbens.
 10183. Coryphaeum.
 10184. Coryphaeum.
 10186. Coryphaeum.
 10189. Pilosum.
 10190. Plicatulum.
 10192. Coryphaeum.
 10200. Nutans.
 10201. Virgatum.
 10213. Plicatulum.
 10228. Conjugatum.
 10249. Paniculatum.
 10278. Saccharoides.
 10281. Fasciculatum

HITCHCOCK, A. S.—Continued

10283. Distichum.
 10285. Millegrana.
 10287. Vaginatum.
 10299. Nutans.
 10301. Nutans.
 10308. Decumbens.
 10337. Serpentinum.
 10338. Pulchellum.
 10340. Multicaule.
 10350. Pumilum.
 10353. Decumbens.
 10366. Millegrana.
 10414. Stramineum.
 11064. Stramineum.
 11620. Millegrana.
 12469. Millegrana.
 13341. Distichum.
 13526. Distichum.
 13561. Fimbriatum.
 13653. Pubiflorum.
 13657. Pubiflorum.
 13672. Fimbriatum.
 13729. Conjugatum.
 13737. Urvillei.
 13803. Distichum.
 13981. Dilatatum.
 14067. Conjugatum.
 14072. Dilatatum.
 14081. Urvillei.
 14182. Conjugatum.
 14214. Dilatatum.
 15153. Dilatatum.
 16079. Floridanum.
 16096. Circulare.
 16107. Distichum.
 16111. Dilatatum.
 16118. Pubescens.
 16126. Circulare.
 16137. Floridanum.
 16141. Pubiflorum.
 16306. Conjugatum.
 16313. Laxum.
 16323. Secans.
 16326. Distichum.
 16333. Fimbriatum.
 16336. Laxum.
 16339. Plicatulum.
 16341. Conjugatum.
 16350. Conjugatum.
 16351. Nutans.
 16365. Conjugatum.
 16372. Virgatum.

HITCHCOCK, A. S.—Continued

16375. Arundinaceum.
 16378. Laxum.
 16383. Vaginatum.
 16386. Fimbriatum.
 16390. Conjugatum.
 16397. Distichum.
 16401. Virgatum.
 16403. Paniculatum.
 16408. Secans.
 16409. Vaginatum.
 16410. Fimbriatum.
 16411. Millegrana.
 16421. Notatum.
 16423. Fimbriatum.
 16424. Conjugatum.
 16438. Plicatulum.
 16439. Virgatum.
 16443. Conjugatum.
 16445. Melanospermum.
 16447. Virgatum.
 16456. Paniculatum.
 16466. Fimbriatum.
 16471. Nesiotes.
 16473. Plicatulum.
 16477. Virgatum.
 16484. Conjugatum.
 16490. Fimbriatum.
 16500. Propinquum.
 16522. Fimbriatum.
 16526. Repens.
 16552. Virgatum.
 16563. Distichum.
 16613. Conjugatum.
 16620. Orbiculatum.
 16781. Millegrana.
 16812. Melanospermum.
 16816. Densum.
 16819. Millegrana.
 16836. Fimbriatum.
 16899. Pumilum.
 16973. Pumilum.
 16974. Pulchellum.
 17011. Pumilum.
 17012. Pumilum.
 17028. Pumilum.
 17034. Nutans.
 17064. Melanospermum.
 17081. Multicaule.
 17083. Nutans.
 17102. Melanospermum.
 17104. Multicaule.
 17105. Multicaule.

HITCHCOCK, A. S.—Continued

17137. Multicaule.
 17187. Multicaule.
 17190. Paniculatum.
 17195. Decumbens.
 17198. Melanospermum.
 17260. Pumilum.
 17269. Pumilum.
 17278. Decumbens.
 17279. Melanospermum.
 17280. Pumilum.
 17336. Virgatum.
 17339. Melanospermum.
 17341. Orbiculatum.
 17421. Decumbens.
 17427. Melanospermum.
 17433. Pumilum.
 17438. Melanospermum.
 17460. Paniculatum.
 17465. Decumbens.
 17470. Melanospermum.
 17477. Millegrana.
 17647. Repens.
 17664. Conjugatum.
 17668. Fimbriatum.
 18030. Conjugatum.
 18034. Vaginatum.
 18099. Dilatatum.
 18105. Vaginatum.
 18194. Vaginatum.
 18580. Distichum.
 18635. Conjugatum.
 18681. Conjugatum.
 18702. Distichum.
 19198. Vaginatum.
 19252. Vaginatum.
 19289. Conjugatum.
 19303. Conjugatum.
 19401. Vaginatum.
 19485. Distichum.
 19487. Distichum.
 19526. Conjugatum.
 19542. Vaginatum.
 19656. Conjugatum.
 19781. Ciliatifolium.
 19784. Ciliatifolium.
 19787. Vaginatum.
 19864. Conjugatum.
 19869. Fimbriatum.
 19885. Caespitosum.
 19886. Saugetii.
 19890. Saugetii.
 19897. Conjugatum.

HITCHCOCK, A. S.—Continued

19899. Plicatulum.
 19904. Minus.
 19907. Pumilum.
 19908. Distichum.
 19909. Pilosum.
 19913. Virgatum.
 19948. Scabrum.
 19955. Racemosum.
 20132. Racemosum.
 20134. Racemosum.
 20161. Conjugatum.
 20177. Microstachyum.
 20180. Paniculatum.
 20202. Orbiculatum.
 20274. Scabrum.
 20341. Racemosum.
 20413. Decumbens.
 20434. Orbiculatum.
 20599. Conjugatum.
 20652. Saccharoides.
 20656. Humboldtianum.
 21138. Microstachyum.
 21210. Decumbens.
 21257. Orbiculatum.
 21269. Pilosum.
 21306. Humboldtianum.
 21464. Tenellum.
 21710. Humboldtianum.
 21761. Saccharoides.
 22061. Decumbens.
 22066. Decumbens.
 22072. Paniculatum.
 22073. Virgatum.
 22076. Crassum.
 22087. Multicaule.
 22089. Conjugatum.
 22102. Virgatum.
 22132. Paniculatum.
 22338. Racemosum.
 22485. Humboldtianum.
 22597. Candidum.
 22624. Paniculatum.
 22627. Paniculatum.
 22633. Conjugatum.
 22675. Plicatulum.
 22686. Saccharoides.
 22696. Consersum.
 22718. Decumbens.
 22722. Paniculatum.
 22730. Distichum.
 22790. Distichum.
 22793. Distichum.

HITCHCOCK, A. S.—Continued

22795. Humboldtianum.
 22830. Humboldtianum.
 22882. Distichum.
 22953. Plicatulum.
 22956. Fimbriatum.
 23224. Notatum.
 23234. Rupestre.
 23242. Lindenianum.
 23259. Millegrana.
 23284. Minus.
 23293. Arundinaceum.
 23305. Minus.
 23326. Lindenianum.
 23340. Distachyon.
 23341. Distachyon.
 23342. Ciliatifolium.
 23343. Secans.
 23346. Blodgettii.
 23348. Lindenianum.
 23352. Fimbriatum.
 23353. Urvillei.
 23355. Rupestre.
 23360. Notatum.
 23363. Lindenianum.
 23366. Millegrana.
 23379½. Clavuliferum.
 23381. Densum.
 23402. Fimbriatum.
 23417. Rupestre.
 23418. Laxum.
 23419. Caespitosum.
 23419½. Rupestre.
 23424. Rupestre.
 23430. Clavuliferum.
 23439. Minus.
 23538. Distichum.

HOLM, T.

84. Secans.
 88. Decumbens.
 91. Fimbriatum.
 152. Rupestre.
 173. Notatum.
 199. Paniculatum.

HOLMGREN, T.

58. Conjugatum.

HOLT, E. G.

16. Dilatatum.

HOLWAY, E. W. D.

64. Humboldtianum.
 129. Humboldtianum.
 168. Candidum.
 594. Conjugatum.
 3065. Tenellum.
 3416. Pubiflorum.
 3421. Notatum.
 3437. Tinctum.
 3510. Humboldtianum.
 3514. Lentiginosum.

HOLWAY, E. W. D., AND M. M.

507. Prostratum.
 680. Paniculatum.
 703. Virgatum.
 726. Paniculatum.
 781. Distichum.
 782. Humboldtianum.
 823. Racemosum.
 1321. Plicatulum.
 1418. Conjugatum.
 1464. Paniculatum.
 1476. Conjugatum.
 1482. Coryphaeum.
 1504. Plicatulum.
 1510. Pilosum.
 1568. Paniculatum.
 1582. Plicatulum.
 1584. Pilosum.
 1597. Paniculatum.
 1607. Plicatulum.
 1612. Paniculatum.
 1624. Pilosum.
 1628. Consersum.
 1630. Paniculatum.
 1644. Coryphaeum.
 1645. Malacophyllum.
 1646. Malacophyllum.
 1650. Paniculatum.
 1657. Pilosum.
 1659. Plicatulum.
 1675½. Paniculatum.
 1679. Paniculatum.
 1708. Stellatum.
 1725. Malacophyllum.
 1731. Paniculatum.
 1776. Paniculatum.
 1781. Paniculatum.
 1793. Paniculatum.
 1948. Pilosum.

HOOD, S. C.

- 6. Lentiferum.
- 28. Longipilum.
- 29. Supinum.
- 66. Rigidifolium.
- 81. Bifidum.

HOSTMANN, F. W.

- 1318. Pulchellum.
- 1321. Pulchellum.

HOUSE, H. D.

- 2342. Laeve.
- 2863. Pubiflorum glabrum.
- 9750. Psammophilum.

HUBBARD, F. T.

- 406. Setaceum.
- 507. Pubescens.

HUSNOT, T.

- 71. Fimbriatum.
- 74. Distichum.
- 76 part. Melanospermum.
- 77. Nutans.
- 79. Paniculatum.

IDINEAL, BROTHER

- 278. Prostratum.

IMRAY, J.

- 311. Saccharoides.

JAHN, A.

- 192. Densum.
- 301. Molle.
- 304. Saccharoides.
- 307. Conjugatum.
- 315. Notatum.
- 347. Conjugatum.
- 349. Conjugatum.

JAMESON, W.

- 540. Repens.
- 552. Microstachyum.

JEFFREYS

- 31. Conjugatum.

24483—29—19

JENMAN, G. S.

- 1904. Repens.
- 3656. Densum.
- 3660. Virgatum.
- 3855*. Repens.
- 3962. Distichum.
- 3967. Conjugatum.
- 4073. Decumbens.
- 4391. Vaginatum.
- 4395. Vaginatum.
- 4437. Virgatum.
- 4442. Repens.
- 4520. Distichum.
- 4522. Vaginatum.
- 4523. Vaginatum.
- 4532. Pulchellum.
- 4586. Distichum.
- 6004. Melanospermum.
- 6005. Orbiculatum.
- 6014. Pulchellum.
- 6015. Pumilum.
- 6020. Repens.
- 6199. Virgatum.
- 6477. Orbiculatum.
- 7109. Repens.

JENSEN, HJALMAR

- 222. Vaginatum.

JERMY, G.

- 8. Pubiflorum.

JIMÉNEZ, OTÓN

- 128. Candidum.
- 160. Squamulatum.
- 175. Plicatulum.
- 387. Variabile.
- 520. Plenum.
- 523. Plenum.
- 528. Plicatulum.
- 529. Humboldtianum.
- 534. Pilosum.
- 726. Repens.
- 736. Plicatulum.
- 739. Conjugatum.
- 742. Jimenezii.
- 743. Plicatulum.
- 927. Distichum.
- 1123. Multicaule.

JOHNSON, HARRY

- 6. Convexum.
- 115. Conjugatum.
- 119. Candidum.
- 260. Conjugatum.
- 279. Conjugatum pubescens.
- 439. Plenum.
- 440. Plicatulum.
- 441. Notatum.
- 454. Boscianum.
- 621. Candidum.
- 831. Candidum.

JOHNSTON, J. R.

- 198. Conjugatam.
- 375. Paniculatum.
- 381. Conjugatum.
- 538. Plicatulum.
- 1011. Plicatulum.

JONES, JOSEPH

- 16. Conjugatum.
- 19. Virgatum.
- 24. Conjugatum.
- 35. Paniculatum.
- 39. Pumilum.
- 47. Laxum.

JONES, M. E.

- 2307. Distichum.

JÖRGENSEN, P.

- 1145. Urvillei.
- 1150. Distichum.
- 1353. Malacophyllum.
- 1765. Humboldtianum.
- 2424. Conjugatum.
- 2425. Plicatulum.
- 2426. Fasciculatum.
- 2882. Stellatum.
- 3298. Distichum.
- 3300. Urvillei.

JULIO, BROTHER

- 44. Humboldtianum.

JÜRGENS, CARLOS

- 41. Urvillei.
- 49. Distichum.

KAPPLER, A.

- 1561. Serpentinum.

KEARNEY, T. H.

- 5. Laeve.
- 8. Boscianum.
- 9. Ciliatifolium.
- 11. Laeve.
- 12. Distichum.
- 13. Floridanum.
- 14. Dilatatum.
- 26. Longepedunculatum.
- 35. Dilatatum.
- 36. Boscianum.
- 37 (in 1895). Floridanum.
- 37 (in 1896). Urvillei.
- 38. Difforme.
- 40. Dissectum.
- 43. Urvillei.
- 47. Setaceum.
- 48. Plicatulum.
- 54 (in 1895). Praecox.
- 54 (in 1896). Pubiflorum glabrum.
- 55. Floridanum.
- 56 (in 1895). Floridanum glabratum.
- 56 (in 1893). Longepedunculatum.
- 62. Circulare.
- 66. Floridanum glabratum.
- 69. Setaceum.
- 70. Ciliatifolium.
- 71. Supinum.
- 78. Laeve.
- 85. Pubiflorum glabrum.
- 93. Distichum.
- 96. Ciliatifolium.
- 97. Longepedunculatum.
- 98. Ciliatifolium.
- 110. Distichum.
- 120. Vaginatum.
- 132. Lentiferum.
- 135. Distichum.
- 136. Setaceum.
- 143 (in 1896). Floridanum.
- 143 (in 1895). Praecox.
- 149. Floridanum.
- 151. Floridanum.
- 152. Boscianum.
- 153. Floridanum.
- 154a. Laeve.
- 154b. Pubiflorum glabrum.
- 161. Floridanum glabratum.
- 162. Pubescens.
- 165. Floridanum.
- 166. Plicatulum.
- 170 (in 1895). Dissectum.
- 170 (in 1896). Longipilum.

KEARNEY, T. H.—Continued

172. *Lentiferum*.
 179. *Floridanum*.
 182. *Laeve*.
 184. *Longipilum*.
 185. *Floridanum glabratum*.
 193. *Plicatulum*.
 195. *Circulare*.
 198. *Pubescens*.
 205 (in 1895). *Boscianum*.
 205 (in 1896). *Floridanum*.
 210. *Dilatatum*.
 216. *Plicatulum*.
 219. *Pubescens*.
 239. *Floridanum*.
 240. *Laeve*.
 253. *Circulare*.
 254. *Laeve*.
 262. *Floridanum*.
 277. *Ciliatifolium*.
 279. *Distichum*.
 280. *Praecox*.
 281. *Boscianum*.
 289. *Floridanum*.
 290. *Lentiferum*.
 292. *Ciliatifolium*.
 296 (in 1896). *Difforme*.
 296 (in 1895). *Longipilum*.
 297. *Pubescens*.
 308. *Laeve*.
 338. *Ciliatifolium*.
 345. *Floridanum*.
 347. *Laeve*.
 350. *Pubescens*.
 351. *Laeve*.
 354. *Laeve*.
 355. *Pubescens*.
 357. *Lentiferum*.
 386. *Setaceum*.
 944. *Longipilum*.
 945. *Setaceum*.
 946. *Pubiflorum glabrum*.
 1473. *Laeve*.
 1785. *Laeve*.
 1856. *Pubescens*.
 1951. *Boscianum*.
 2028. *Distichum*.
 2142. *Floridanum glabratum*.
 2168. *Floridanum*.
 2281. *Vaginatulum*.
 2296. *Distichum*.
 2341. *Boscianum*.

KELLERMAN, W. A.

8. *Stramineum*.
 30. *Stramineum*.
 5118. *Paniculatum*.
 5761. *Paniculatum*.
 5803. *Adoperiens*.
 6245. *Convexum*.
 6260. *Paniculatum*.
 6807. *Pubescens*.

KELLOGG, J. H.

39. *Pubescens*.

KEMP, J. S.

2. *Virgatum*.
 7. *Plicatulum*.
 19½. *Conjugatum*.
 32. *Conjugatum*.
 42½. *Conjugatum*.
 47. *Distichum*.
 52. *Fimbriatum*.
 56. *Distichum*.

KENOYER, L. A.

112. *Saccharoides*.
 128. *Decumbens*.

KENYON, G. G. S.

3. *Propinquum*.
 13. *Propinquum*.
 15. *Propinquum*.

KERBER, E.

24. *Variabile*.
 49. *Conjugatum*.

KILLIP, E. P.

4003. *Acutum*.
 4006. *Microstachyum*.
 4011. *Pilosum*.
 4012. *Plicatulum*.
 4027. *Minus*.
 4031. *Plicatulum*.
 4077. *Centrale*.
 4084. *Boscianum*.
 4099. *Plicatulum*.
 4106. *Densum*.
 4109. *Virgatum*.
 4112. *Paniculatum*.
 4116. *Plicatulum*.
 4125. *Nutans*.

KILLIP, E. P.—Continued

4134. Multicaule.
 4231. Repens.
 4260. Parviflorum.
 4280. Plicatum.
 4329. Paniculatum.
 4356. Virgatum.
 4510. Candidum.
 4522. Humboldtianum.
 4555. Heterotrichon.
 4558. Pilosum.
 4582. Minus.
 5050. Plicatum.
 5051. Virgatum.
 5342. Decumbens.
 6002. Decumbens.
 6315. Setaceum.
 6861. Prostratum.
 7265. Laeve.
 11568. Virgatum.
 12125. Fasciculatum.

KILLIP, E. P., AND HAZEN, T. E.

11127. Paniculatum.

KILLIP, E. P., AND SMITH, A. C.

14568. Repens.
 14755. Conjugatum.
 14780. Virgatum.
 15025. Paniculatum.
 15112. Pilosum.
 15236. Multicaule.
 15494. Scabrum.
 15573. Paniculatum.
 16192. Trachycoleon.
 16496. Notatum.
 16936. Prostratum.
 16969. Scabrum.
 17018. Candidum.
 18024. Prostratum.
 18487. Scabrum.
 19038. Trachycoleon.
 19770. Humboldtianum.
 20810. Scabrum.
 20965. Fimbriatum.

KOORDERS, S. H.

- 23079b. Conjugatum.
 23503. Conjugatum.

KUHLMANN, G.

1280. Fasciculatum.
 1663. Gardnerianum.

KUHLMANN, G.—Continued

1664. Gardnerianum.
 1680. Orbiculatum.
 1682. Parviflorum.
 1682a. Parviflorum.
 1698. Lineare.
 3121. Repens.
 3170. Subciliatum.
 3172. Coryphaeum.
 3352. Virgatum.
 3357. Orbiculatum.
 5998. Pectinatum.

LANGLOIS, A. B.

18. Debile.
 19. Plicatum.
 19a. Circulare.
 20. Difforme.
 21. Floridanum.
 22. Lentiferum.
 25. Conjugatum.
 26. Boscianum.
 151. Urvillei.

LANKESTER, C. H.

203. Paniculatum.

LATHAM, ROY

258. Pubescens.
 263. Pubescens.
 321. Pubescens.
 3520. Psammophilum.

LAWRENCE, W. E.

2095. Distichum.

LECHLER, W.

1862. Candidum.
 2275. Conjugatum.

LEHMANN, F. C.

973. Paniculatum.
 979. Pectinatum.
 1571. Distichum.
 1662. Notatum.
 3457. Plicatum.
 5398. Plicatum.
 8543. Conjugatum.

LÉON, BROTHER

- 117b. Notatum.
 268. Caespitosum.

LÉON, BROTHER—Continued

272. Lividum.
 286. Saugetii.
 302. Conjugatum.
 564. Alterniflorum.
 571. Lividum.
 578. Virgatum.
 579. Paniculatum.
 581. Alterniflorum.
 585. Alterniflorum.
 587. Langei.
 588. Lividum.
 759. Racemosum.
 768. Caespitosum.
 779. Ciliatifolium.
 781. Plicatulum.
 782. Conjugatum.
 811. Vaginatum.
 926. Plicatulum.
 927. Plicatulum.
 927b. Plicatulum.
 928. Notatum.
 929. Distichum.
 931. Millegrana.
 931b. Secans.
 932. Secans.
 933. Paniculatum.
 934. Langei.
 935. Caespitosum.
 935b. Saugetii.
 936. Caespitosum.
 937. Lividum.
 938. Conjugatum.
 938c. Conjugatum.
 938d. Conjugatum.
 939b. Conjugatum.
 939c. Conjugatum.
 940. Distichum.
 941. Distichum.
 942. Clavuliferum.
 943. Alterniflorum.
 944. Lindenianum.
 945. Alterniflorum.
 945b. Lindenianum.
 946. Distortum.
 947. Unispicatum.
 948. Saugetii.
 949. Rupestre.
 950. Rupestre.
 951. Laxum.
 953. Caespitosum.
 954. Blodgettii.
 956. Bakeri.

LÉON, BROTHER—Continued

1511. Langei.
 1527. Saugetii.
 1984. Conjugatum.
 1986. Pubiflorum.
 1987. Millegrana.
 1989. Plicatulum.
 1990. Virgatum.
 1991. Distichum.
 1992. Distichum.
 1995. Virgatum.
 1996. Breve.
 1997. Breve.
 2381. Caespitosum.
 2401. Unispicatum.
 2556. Alterniflorum.
 2561. Alterniflorum.
 2614. Distachyon.
 2625. Bakeri.
 2639. Virgatum.
 2642. Distichum.
 2691. Rupestre.
 2738. Propinquum.
 2783. Distachyon.
 2870. Millegrana.
 3446. Laxum.
 3454. Plicatulum.
 3457. Lindenianum.
 3462. Plicatulum.
 3470. Plicatulum.
 3473. Alterniflorum.
 3477. Breve.
 3478. Propinquum.
 3482. Rupestre.
 3676. Caespitosum.
 3694. Saugetii.
 3701. Caespitosum.
 3781. Paniculatum.
 3962. Virgatum.
 3978. Paniculatum.
 3980. Saugetii.
 4099. Unispicatum.
 4100. Breve.
 4157. Millegrana.
 4160. Millegrana.
 4183. Langei.
 4333. Plicatulum.
 4413. Distichum.
 4430. Conjugatum.
 4468. Minus.
 4526. Notatum.
 4557. Plicatulum.
 4569. Decumbens.

LÉON, BROTHER—Continued

4570. Nanum.
 4635. Lividum.
 4664. Saugetii.
 5075. Conjugatum.
 5167. Notatum.
 5272. Lindenianum.
 5273. Distortum.
 5364. Plicatulum.
 5582. Unispicatum.
 5680. Alterniflorum.
 5681½. Breve.
 6009. Filiforme.
 6204. Distichum.
 6321. Langei.
 6354. Blodgettii.
 6417. Clavuliferum.
 6418. Clavuliferum.
 6419. Plicatulum.
 6420. Densum.
 6423. Notatum.
 6734. Vaginatum.
 6735. Millegrana.
 6743. Secans.
 7057. Distortum.
 7346. Lindenianum.
 7499. Saugetii.
 7501. Caespitosum.
 7521. Propinquum.
 7537. Distichum.
 8628. Blodgettii.
 8783. Debile.
 8981. Caespitosum.
 8982. Saugetii.
 9135. Densum.
 9142. Rupestre.
 9182. Blodgettii.
 9183. Millegrana.
 9185. Pulchellum.
 9469. Caespitosum.
 9764. Fimbriatum.
 11336. Lineare.
 11344. Pulchellum.
 11690. Blodgettii.
 11713. Caespitosum.
 11719. Blodgettii.
 12302. Rupestre.
 12305. Laxum.
 12313. Laxum.
 12314. Caespitosum.
 12315. Orbiculatum.
 12450. Saugetii.
 12457. Distichum.

LÉON, BROTHER—Continued

12470. Rupestre.
 12471. Lindenianum.
 12472. Filiforme.
 12473. Distortum.
 12558. Filiforme.
 13079. Acutifolium.
 13119. Acutifolium.

LÉON AND ARSÈNE, BROTHERS

11010 Rupestre.

LÉON, BROTHER, AND CAZAÑOS, F. R.

5844. Plicatulum.
 5850. Reptatum.

LÉON AND CHARLES, BROTHERS

4856. Minus.
 4857. Distortum.
 4858. Clavuliferum.

LÉON AND CLEMENT, BROTHERS

6655. Clavuliferum.
 6661. Distortum.

LÉON AND CLEMENT, BROTHERS, AND
ROCA, M.

9811. Breve.

LÉON AND EDMOND, BROTHERS

8607. Edmondi.
 8682. Edmondi.

LÉON AND HIORAM, BROTHERS

4363. Plicatulum.
 4364. Millegrana.
 4366. Virgatum.
 4366½. Secans.
 4367. Virgatum.
 4461. Plicatulum.
 5602. Saugetii.
 5604. Propinquum.

LÉON, BROTHER, AND LOUSTALOT, A.

9346. Filiforme.
 9354. Motembense.
 9376. Capillifolium.
 9382. Rocanum.
 9392. Rocanum.
 9413. Millegrana.
 9534. Distachyon.
 11337. Rocanum.

LÉON, BROTHER, AND ROCA, M.

- 6936. Pulchellum.
- 6989. Notatum.
- 7452. Filiforme.
- 7455. Propinquum.
- 8042. Distortum.
- 8156. Pulchellum.
- 8164. Acutifolium.
- 8223. Capillifolium.
- 8233. Rocanum.
- 8871. Rocanum.

LÉON, BROTHER, AND ROIG, J. T.

- 12961. Secans.

LÉON, BROTHER, AND SHAFER, J. A.

- 13670. Minus.

LÉON, BROTHER, AND VOISARD

- 930. Vaginatulum.

LEONARD, E. C.

- 2313. Setaceum.
- 2796. Fimbriatum.
- 2820. Fimbriatum.
- 2827. Caespitosum.
- 2911. Caespitosum.
- 2915. Caespitosum.
- 3173. Fimbriatum.
- 3217. Fimbriatum.
- 3221. Fimbriatum.
- 3339. Laxum.
- 3425. Conjugatum.
- 3626. Paniculatum.
- 3627. Saugetii.
- 3711. Conjugatum.
- 3837. Fimbriatum.
- 4075. Saugetii.
- 4174. Arundinaceum.
- 4183. Conjugatum.
- 4187. Arundinaceum.
- 4216. Caespitosum.
- 4296. Plicatulum.
- 4298. Heterotrichon.
- 4830. Lindenianum.
- 4871. Conjugatum.
- 4881. Fimbriatum.
- 5059. Distichum.
- 5062. Conjugatum.
- 5126. Caespitosum.
- 5187. Conjugatum.
- 7124. Plicatulum.

LEONARD, E. C.—Continued

- 7186. Caespitosum.
- 7289. Stellatum.
- 7354. Plicatulum.
- 7355. Plicatulum.
- 7418. Caespitosum.
- 7526. Stellatum.
- 7537. Heterotrichon.
- 7537a. Stellatum.
- 7579. Plicatulum.
- 7731. Conjugatum.
- 7793. Heterotrichon.
- 7795a. Heterotrichon.
- 7840. Decumbens.
- 7853. Plicatulum.
- 7855. Decumbens.
- 7989. Densum.
- 8078. Paniculatum.
- 8079. Plicatulum.
- 8080. Paniculatum.
- 8204. Conjugatum.
- 8241. Plicatulum.
- 8357. Densum.
- 8416. Distichum.
- 8434. Lindenianum.
- 8650. Virgatum.
- 8810. Saugetii.
- 8957. Heterotrichon.
- 9079. Arundinaceum.
- 9174. Virgatum.
- 9223. Virgatum.
- 9289. Paniculatum.
- 9336. Decumbens.
- 9406. Fimbriatum.
- 9408. Virgatum.
- 9672. Virgatum.
- 10030. Saugetii.
- 10080. Virgatum.

LEPRIEUR

- 77. Pulchellum.
- 80. Melanospermum.
- 81. Decumbens.
- 82. Pilosum.
- 83. Multicaule.
- 85. Parviflorum.
- 87. Melanospermum.
- 90. Oligostachyum.
- 91. Nutans.

LEVINE, C. O.

- 1237. Conjugatum.

LEVY, P.

1138. *Microstachyum*.

LIEBMANN, F. M.

153. *Orbiculatum*.
 154. *Minus*.
 156 part. *Minus*.
 156 part. *Notatum*.
 158. *Conjugatum*.
 160. *Conjugatum*.
 161. *Conjugatum*.
 163. *Paniculatum*.
 164. *Paniculatum*.
 168. *Variabile*.
 169. *Affine*.
 173. *Plenum*.
 177. *Variabile*.
 178. *Variabile*.
 179. *Variabile*.
 182. *Plicatulum*.
 184. *Langei*.
 185. *Langei*.
 188. *Langei*.
 194. *Alterniflorum*.
 196. *Jaliscanum*.
 199. *Jaliscanum*.
 201. *Alterniflorum*.
 220. *Unispicatum*.
 221. *Humboldtianum*.
 224. *Cymbiforme*.
 225. *Cymbiforme*.
 226. *Cymbiforme*.
 6329. *Langei*.

LILLO, M.

4284. *Humboldtianum*.
 6240. *Malacophyllum*.

LINDEN, J. J.

1555. *Trachycoleon*.
 1813. *Lindenianum*.

LINDHEIMER, F.

567. *Pubiflorum*.
 1269. *Distichum*.

LINDMAN, C. A. M.

1347. *Paniculatum*.

LLAMAS, B.

3047 (Herb. Parodi). *Unispicatum*.

LLOYD, C. G.

1033. *Fimbriatum*.

LÖFGREN, ALBERT

267. *Pectinatum*.
 469. *Urvillei*.
 503. *Paniculatum*.
 1516. *Gardnerianum*.
 3812. *Plicatulum*.

LÖFGREN, A., AND EDWALL, G.

2020. *Conjugatum pubescens*.

LOHER, A.

1745. *Conjugatum*.

LOMBARDO, A

1786. *Vaginatum*.
 1801. *Plicatulum*.
 1813. *Distichum*.
 1818. *Vaginatum*.
 1978. *Notatum*.

LOOMIS, M. L.

1666. *Pubescens*.

LORENTZ, P. G.

70. *Fasciculatum*.

LORENTZ, P. G., AND HIERONYMUS,
 G. H.

184. *Humboldtianum*.

LÜTZELBURG, P. VON

26. *Vaginatum*.
 5538. *Repens*.

MCATEE, W. L.

1689 A. *Vaginatum*.
 2164. *Repens*.
 2782. *Longipilum*.

MACBRIDE, J. F.

2878. *Conjugatum*.
 3519. *Notatum*.
 3749. *Heterotrichon*.
 3951. *Candidum*.
 4057. *Conjugatum*.

MACBRIDE, J. F., AND FEATHER-
STONE, W.

43. Paniculatum.
506. Conjugatum.
517. Humboldtianum.
1366. Candidum.

McCARTHY, GERALD

309. Laeve.

MACDOUGAL, D. T.

571. Distichum.

McFARLAND, F. T.

158. Pubiflorum glabrum.

McFARLAND F. T., AND ANDERSON,
W. A.

222. Repens.
255. Pubiflorum glabrum.
326. Pubiflorum glabrum.
341. Pubiflorum glabrum.

McGREGOR, E. A.

180. Laeve.

McGREGOR, R. C.

61. Conjugatum.
516. Dilatatum.
10426 (BS). Conjugatum.
23133 (BS). Conjugatum.

MACKENZIE, K. K.

1718. Floridanum.

MACQUERYS

17. Paniculatum.

MALME, G. O. A.

117. Plicatulum.
1562 B. Heterotrichon.
1562 E. Stellatum.
2395. Paniculatum.
3153. Heterotrichon.
3222. Pictum.

MALTBY, F. S.

242. Pubiflorum.

MANDON, GILBERT

1254. Humboldtianum.

MARCHESI, L.

1749. Vaginatum.
1859. Notatum.
3104. Notatum.

MARSH, EVA M.

51. Pumilum.

MATHEWS, ANDREW

425. Racemosum.
426. Racemosum.

MATTOS, MELLO

- 16004 (Mus. Nac. Rio Jan.). Vagina-
tum.

MAXON, W. R.

768. Fimbriatum.
1642. Fimbriatum.
2363. Conjugatum.
2812. Plicatulum.
2980. Virgatum.
5893. Laeve.
6514. Plicatulum.
6516. Conjugatum.
7143. Paniculatum.
7257. Vaginatum.
7337. Vaginatum.

MAXON, W. R., AND HAY, R.

3527. Adoperiens.

MAXON, W. R., AND KILLIP, E. P.

58. Decumbens.
138. Conjugatum.
190. Decumbens.
268. Paniculatum.
292. Fimbriatum.
459. Blodgettii.
504. Caespitosum.
1519. Blodgettii.
1521. Fimbriatum.
1524. Fimbriatum.
1609. Caespitosum.
1669. Fimbriatum.
1719. Plicatulum.

MAXON, W. R., AND STANDLEY, P. C.

14. Laeve.

MEARNS, E. A.

721. Distichum.
 742. Distichum.
 789. Distichum.
 1979. Distichum.
 2619. Distichum.
 2981 (BS). Conjugatum.

MEISLAHN, MARIE

64. Bifidum.
 170a. Supinum.

MELVILLE

109. Clavuliferum.
 118. Coryphaeum.
 144. Pulchellum.
 145. Melanospermum.
 161. Millegrana.
 163. Gardnerianum.

MERRILL, E. D.

34. Conjugatum.
 122. Conjugatum.
 607 (Kneucker Gram.). Conjugatum.
 805 (Kneucker Gram.). Vaginatum.
 1137. Conjugatum.
 5229. Vaginatum.

METCALF, F. P.

915. Circulare.
 1122. Repens.

METCALFE, O. B.

1501. Distichum.

MEXIA, YNEZ

570. Notatum.
 829. Plenum.
 1022. Longicuspe.
 1830. Paniculatum.

MILLE, LUIS

11. Repens.
 304. Conjugatum.

MILLER, O. O., AND JOHNSTON, J. R.

178. Conjugatum.

MILLER, W. DE W., AND GRISCOM, L.

143. Squamulatum.
 144. Squamulatum.

MILLSPAUGH, C. F.

944. Fimbriatum.
 1408. Blodgettii.
 1907. Paniculatum.

MOLLER

130. Paniculatum.

MOORE, H. F.

237. Paniculatum.

MOORE, J. C.

18. Distichum.

MORALES, R.

700. Distichum.
 708. Plicatulum.
 715. Tenellum.
 719. Virgatum.
 720. Lividum.
 722. Notatum.
 728a. Costaricense.

MORITZ, J. W. K.

1537. Trachycoleon.
 1546. Repens.

MORONG, THOMAS

247. Conjugatum.
 282. Repens.
 535. Fasciculatum.
 548. Notatum.
 549. Urvillei.
 553. Paniculatum.
 1584. Lividum.

MORRIS, E. L.

1284. Laeve.

MOSÉN, H.

3005. Conjugatum.
 3511. Urvillei.
 4569. Paniculatum.

MOSIER, C. A.

153. Conjugatum.
 178. Blodgettii.
 250. Monostachyum.

MÜLLER, F.

2036. Humboldtianum.
2037. Humboldtianum.
2061. Lividum.

MUELLO

- 4703 (Herb. Parodi). Lineare.

NASH, G. V.

209. Ciliatifolium.
216. Plicatulum.
507. Longipilum.
600 part. Ciliatifolium.
600 part. Longipilum.
629. Rigidifolium.
680. Pubiflorum glabrum.
946. Debile.
1001. Ciliatifolium.
1027. Longipilum.
1035. Distichum.
1205. Distichum.
1208. Giganteum.
1340. Longipilum.
1359. Giganteum.
1417 part. Longepedunculatum.
1417 part. Setaceum.
1418 part. Ciliatifolium.
1418 part. Supinum.
1426. Ciliatifolium.
1427. Propinquum.
1619. Lentiferum.
1699. Repens.
1754. Giganteum.
2019. Debile.
2047. Lentiferum.
2074. Longepedunculatum.
2080. Longipilum.
2298. Dilatatum.
2344. Longipilum.
2346. Boscianum.
2359a. Ciliatifolium.
2445. Caespitosum.
2579. Bifidum.

NASH, G. V., AND TAYLOR, N.

956. Secans.
1353. Bakeri.
1445. Alterniflorum.

NEALLEY, G. C.

75. Lividum.
89. Floridanum.

NEALLEY, G. C.—Continued

91. Circulare.
92. Pubiflorum.
95. Hartwegianum.

NELSON, E. W.

486. Dilatatum.
523. Lividum.
727. Squamulatum.
1262. Notatum.
2735. Sanguineolentum.
2735a. Sanguineolentum.
2853. Plicatulum.
3033. Notatum.
3035. Virgatum.
3047. Nelsoni.
3055. Conjugatum pubescens.
3424. Stellatum.
6832. Pubiflorum.

NICHOLS, G. E.

202. Conjugatum.

NICOLAS, BROTHER

131. Crinitum.
5410. Distichum.

NORTON, J. B.

313. Laeve.
340. Ciliatifolium.
358a. Pubescens.
358b. Longipilum.
358c. Floridanum.
367a. Laeve.
367b. Pubescens.
367c. Ciliatifolium.
385a. Ciliatifolium.
385c. Plicatulum.
563. Stramineum.
585b. Supinum.

NOVAES, C.

1272. Pectinatum.
1277. Conjugatum pubescens.
1278. Urvillei.

NOYES, E. B.

106. Floridanum
109. Laeve.
109½. Longipilum.
110. Longipilum.

NUSKER, J. D.

1227. *Conjugatum*.

OERSTED, A. S.

14008. *Saccharoides*.14107. *Minus*.

OLIVA, J. C.

31. *Longicuspe*.68. *Virgatum*.80. *Propinquum*.97. *Convexum*.

OLIVE, E. W.

9. *Distichum*.21. *Hartwegianum*.

ORCUTT, C. R.

512a. *Distichum*.2891. *Debile*.3245. *Orbiculatum*.3246. *Paniculatum*.3248. *Conjugatum*.3889. *Convexum*.

ORTEGA, J. G.

4102. *Botterii*.4333. *Humboldtianum*.

PADILLA, S. A.

347. *Dilatatum*.391. *Centrale*.393. *Crassum*.400. *Plicatulum*.594. *Langei*.

PALMER, EDWARD

16 (in 1869). *Paucispicatum*.16 (in 1897). *Conjugatum*.18. *Paniculatum*.45. *Pubiflorum*.79. *Pubiflorum*.138. *Notatum*.144 (in 1886, part). *Botterii*.144 (in 1886, part). *Paniculatum*.144 (in 1897). *Plicatulum*.190. *Plicatulum*.192. *Distichum*.206. *Lividum*.214. *Distichum*.243. *Paucispicatum*.245. *Lividum*.259. *Distichum*.261. *Pubiflorum*.

PALMER, EDWARD—Continued

286. *Humboldtianum*.295. *Notatum*.338. *Crinitum*.367. *Conjugatum*.368. *Stramineum*.369. *Pubiflorum glabrum*.391. *Distichum*.393. *Distichum*.395. *Pubiflorum*.419. *Conjugatum*.468. *Plicatulum*.592. *Convexum*.693. *Paucispicatum*.704. *Palmeri*.871. *Pubiflorum*.1265. *Paniculatum*.1272. *Conjugatum*.1549. *Conjugatum*.1552. *Lividum*.1555. *Paniculatum*.1556. *Lentiginosum*.1647. *Culiacanum*.1658. *Convexum*.1924. *Paniculatum*.

PALMER, E. J.

967. *Pubiflorum glabrum*.968. *Dissectum*.969. *Dissectum*.970. *Floridanum*.2334. *Pubiflorum glabrum*.3066. *Pubescens*.3067. *Circulare*.3140. *Circulare*.30999. *Distichum*.31488. *Circulare*.31640. *Circulare*.31679. *Ciliatifolium*.31721. *Floridanum glabratum*.

PALMER, W., AND RILEY, J. H.

97. *Virgatum*.179a. *Paniculatum*.541. *Conjugatum*.544. *Paniculatum*.628. *Virgatum*.813. *Arundinaceum*.848. *Vaginatulum*.947. *Plicatulum*.949. *Lindenianum*.978. *Minus*.1057. *Virgatum*.1119. *Notatum*.

PAMMEL, L. H.

619. Stramineum.

PARISH, S. B.

8620. Urvillei.

PARODI, L. R.

7. Alcalinum.
 8. Distichum.
 12. Plicatulum.
 35. Dilatatum.
 144. Notatum.
 145. Notatum.
 1178. Alcalinum.
 3297. Repens.
 3465. Repens.
 3993. Distichum.
 4515. Stellatum.
 4664. Stellatum.
 4701. Gardnerianum.
 5534. Consersum.
 6213. Acuminatum.
 7070. Stellatum.
 8318. Distichum.
 8345. Fasciculatum.

PARODI, L. R. (HERB. OSTEN)

15239. Plicatulum.

PAULSEN, O.

313. Vaginatum.

PEATTIE, D. C.

1903. Caespitosum.

PEEBLES, R. H., AND HARRISON, G. J.

4745. Stramineum.

PEEBLES, R. H., HARRISON, G. J.
 AND KEARNEY, T. H.

230. Distichum.

PENNELL, F. W.

1437. Pictum.
 1505. Saccharoides.
 1748. Conjugatum.
 2144. Longipilum.
 2155. Setaceum.
 2168. Floridanum glabratum.
 2203. Laeve.
 2273. Laeve.

PENNELL, F. W.—Continued

3213. Conjugatum.
 3318. Scabrum.
 3349. Saccharoides.
 3747. Virgatum.
 3797. Conjugatum.
 3933. Fasciculatum.
 3937. Repens.
 4590. Virgatum.
 4689. Conjugatum.
 5011. Conjugatum.
 5021. Paniculatum.
 13991. Candidum.

PENNELL, F. W., AND KILLIP, E. P.

5949. Plicatulum.
 5950. Paniculatum.
 8120. Paniculatum.
 8164. Pilosum.

PENNELL, F. W., KILLIP, E. P.,
 AND HAZEN, T. E.

8470. Plicatulum.

PERKINS, J. R.

1078. Paniculatum.
 1485. Decumbens.
 1486. Fimbriatum.
 1487. Paniculatum.
 1488. Notatum.

PFLANZ, CARLOS

2007. Conjugatum.

PICKEL, D. B.

1346. Oligostachyum.
 1358. Orbiculatum.
 1395. Plicatulum.
 1397. Virgatum.
 1402. Plicatulum.
 1561. Coryphaeum.
 1583. Molle.
 1584. Clavuliferum.
 1586. Plicatulum.
 1605. Clavuliferum.
 1618. Oligostachyum.
 1619. Paniculatum.
 1719. Fimbriatum.

PIERCE, W. H.

804a. (Kneucker Gram.) Dilatatum.

PIPER, C. V.

4200. Distichum.
 5198. Plicatulum.
 5198½. Plicatulum.
 5199. Virgatum.
 5201. Paniculatum.
 5203. Virgatum.
 5204. Paniculatum.
 5205. Repens.
 5206. Plicatulum.
 5207. Paniculatum.
 5208. Paniculatum.
 5215. Fasciculatum.
 5293. Minus

PITTIER, H.

206. Conjugatum pubescens.
 207. Decumbens.
 219. Humboldtianum.
 249. Paniculatum.
 250. Virgatum.
 258. Caespitosum.
 306. Distichum.
 360. Dilatatum.
 362. Orbiculatum.
 363. Urvillei.
 507. Clavuliferum.
 535. Decumbens.
 536. Orbiculatum.
 537. Conjugatum.
 538. Decumbens.
 540. Pumilum.
 640. Conjugatum.
 641. Minus.
 659. Pilosum.
 845. Notatum.
 935. Minus.
 992. Plicatulum.
 993. Notatum.
 999. Plicatulum.
 1183. Orbiculatum.
 1238. Candidum.
 1472. Plicatulum.
 1525. Humboldtianum.
 1530. Humboldtianum.
 1539. Pilosum.
 1581. Conjugatum.
 1586. Paniculatum.
 1788. Trachycoleon.
 1832a. Trachycoleon.
 1847. Blodgettii.
 2079. Virgatum.
 2084. Conjugatum.

PITTIER, H.—Continued

2381. Nutans.
 2409. Plenum.
 2444. Conjugatum.
 2480. Conjugatum.
 2601. Conjugatum.
 2690. Virgatum.
 2695. Pectinatum.
 2996. Virgatum.
 3009. Conjugatum.
 3041. Paniculatum.
 3109. Conjugatum.
 3275. Plicatulum.
 3375 part. Decumbens.
 3375 part. Nutans.
 3426. Orbiculatum.
 3435. Conjugatum.
 3436. Conjugatum.
 3478. Coryphaeum.
 3584. Pectinatum.
 3604. Virgatum.
 3622. Plicatulum.
 3655. Decumbens.
 3658. Minus.
 3722. Paniculatum.
 3724. Virgatum.
 3725. Plicatulum.
 3745. Saccharoides.
 4020. Fasciculatum.
 4147. Orbiculatum.
 4231. Paniculatum.
 4232. Vaginatum.
 4260. Conjugatum.
 4261. Vaginatum.
 4314. Conjugatum.
 4329. Distichum.
 4325. Notatum.
 4351. Pectinatum.
 4435. Fasciculatum.
 4436. Microstachyum.
 4453. Notatum.
 4462. Microstachyum.
 4463. Stellatum.
 4474. Pictum.
 4494. Plicatulum.
 4500. Subciliatum.
 4515. Multicaule.
 4525. Clavuliferum.
 4527. Centrale.
 4551. Plicatulum.
 4613. Orbiculatum.
 4621. Centrale.
 4622. Multicaule.

PITTIER, H.—Continued

4624. Minus.
 4632. Hitchcockii.
 4646. Densum.
 4647. Virgatum.
 4648. Plicatulum.
 4693. Virgatum.
 4719. Nutans.
 4742. Plicatulum.
 4866. Multicaule.
 4871. Multicaule.
 4914. Plicatulum.
 4959. Convexum.
 5020. Stellatum.
 5063. Contractum.
 5064. Stellatum.
 5149. Multicaule.
 5185. Decumbens.
 5325. Pilosum.
 5345. Minus.
 5364. Pilosum.
 5752. Decumbens.
 5753. Nutans.
 5902. Trachycoleon.
 5924. Unispicatum.
 6000. Fimbriatum.
 6033. Trachycoleon.
 6093. Fimbriatum.
 6098. Plicatulum.
 6101. Decumbens.
 6155. Humboldtianum.
 6157. Fimbriatum.
 6164. Unispicatum.
 6166. Conjugatum.
 6201. Stellatum.
 6202. Humboldtianum.
 6223. Paniculatum.
 6308. Notatum.
 6317. Vaginatum.
 6457. Unispicatum.
 6731. Plicatulum.
 6760. Centrale.
 6763. Plicatulum.
 6767. Paniculatum.
 6768. Virgatum.
 6779. Centrale.
 6789. Microstachyum.
 6808. Repens.
 6817. Centrale.
 6841. Fasciculatum.
 6907. Saccharoides.
 6982. Convexum.
 7147. Fasciculatum.

PITTIER, H.—Continued

7164. Plicatulum.
 7177. Notatum.
 7212. Notatum.
 7216. Humboldtianum.
 7228. Unispicatum.
 7235. Unispicatum.
 7236. Lividum.
 7242. Notatum.
 7287. Plicatulum.
 7305. Plicatulum.
 7354 (Costa Rica). Conjugatum.
 7354 (Venezuela). Humboldtianum.
 7386. Plicatulum.
 7487 part. Heterotrichon.
 7487 part. Stellatum.
 7489. Stellatum.
 7720. Paniculatum.
 7964a. Notatum.
 8169. Stellatum.
 8581. Decumbens.
 8605. Conjugatum.
 8638. Convexum.
 9022. Fimbriatum.
 9036. Convexum.
 9049. Convexum.
 9055. Pilosum.
 9098. Conjugatum.
 9301. Paniculatum.
 9434. Plicatulum.
 9559. Humboldtianum.
 9616. Unispicatum.
 9626. Humboldtianum.
 9633. Lividum.
 9642. Unispicatum.
 9656. Notatum.
 9707. Notatum.
 9708. Fimbriatum.
 9734. Humboldtianum.
 9743. Unispicatum.
 9755. Microstachyum.
 9756. Plicatulum.
 10218. Molle.
 10581. Plicatulum.
 10622. Paniculatum.
 10624. Densum.
 10821. Minus.
 10835. Melanospermum.
 10861. Melanospermum.
 10928. Decumbens.
 11001. Multicaule.
 11083. Conjugatum pubescens.
 11164. Fimbriatum.

PITTIER, H.—Continued

- 11207. Fimbriatum.
- 11326. Stellatum.
- 11553. Unispicatum.
- 11998. Stellatum.
- 12386. Virgatum.
- 12509. Convexum.
- 12697. Vaginatum.
- 12818. Trachycoleon.
- 12820. Humboldtianum.
- 12822. Plicatulum.
- 12823. Plicatulum.
- 12878. Plicatulum.
- 16118. Fasciculatum.
- 16119. Costaricense.
- 16120. Notatum.
- 16269. Decumbens.
- 16734. Conjugatum pubescens.

PLANK, E. N.

- 6. Pubescens.
- 16 (in 1892). Stramineum.
- 16 (in 1894). Distichum.
- 22. Distichum.
- 40. Pubiflorum.
- 42. Plicatulum.
- 46. Circulare.
- 53. Distichum.
- 61. Ciliatifolium.
- 72. Distichum.
- 87. Langei.
- 94. Laeve.

PÖPPIG, E. F.

- 957. Paniculatum.
- 2863. Repens.

POLLARD, C. L.

- 611. Pubescens.
- 1100. Floridanum.
- 1108. Plicatulum.
- 1118. Floridanum glabratum.
- 1131. Setaceum.
- 1206. Lentiferum.
- 1324. Distichum.
- 1335. Dilatatum.

POLLARD, C. L., COLLINS, G. N., AND
MORRIS, E. L.

- 74. Caespitosum.
- 124. Blodgettii.

POLLARD, C. L., AND MAXON, W. R.

- 69. Laeve.
- 71. Setaceum.
- 75. Laeve.
- 527. Distichum.

POPENOE, D. H.

- 13. Virgatum.
- 36. Repens.
- 54. Microstachyum.

POPENOE, WILSON

- 670. Lividum.
- 696. Notatum.
- 893. Conjugatum.
- 894. Paniculatum.
- 899. Plicatulum.
- 901. Conjugatum pubescens.
- 906. Paniculatum.
- 909. Fasciculatum.
- 913. Candidum.

PRETZ, H. W.

- 1403. Longipilum.

PRIER, C. W.

- 64. Distichum.

PRINGLE, C. G.

- 374. Pubiflorum.
- 427. Pubiflorum.
- 1123. Stramineum.
- 1175. Convexum.
- 1750. Humboldtianum.
- 1875. Convexum.
- 2042. Paniculatum.
- 2049. Lividum.
- 2359. Clavuliferum.
- 2516. Lividum.
- 3129. Conjugatum.
- 3343. Prostratum.
- 3695. Vaginatum.
- 3755. Crinitum.
- 3764. Alcalinum.
- 3772. Plicatulum.
- 3774. Notatum.
- 3779. Botterii.
- 3854. Longicuspe.
- 3991. Langei.
- 5572. Humboldtianum.
- 6215. Conjugatum.

PRINGLE, C. G.—Continued

6427. Convexum.
 6474. Tenellum.
 6717. Unispicatum.
 6780. Distichum.
 7167. Prostratum.
 7532. Distichum.
 7537. Pubiflorum.
 7884. Candidum.
 8891. Prostratum.
 9211. Affine.
 9583. Convexum.
 9599. Hartwegianum.
 9600. Tinctum.
 11239. Tenellum.
 11240. Notatum.
 11757. Humboldtianum.
 11761. Convexum.
 11762. Clavuliferum.

PRINGLE, C. G., AND CONZATTI, C.

349. Lividum.

PURPUS, C. A.

441. Plicatulum.
 443. Squamulatum.
 2158. Conjugatum.
 2202. Humboldtianum.
 2901. Humboldtianum.
 2906. Plenum.
 3772. Plicatulum.
 3777. Plicatulum.
 5421. Vaginatum.
 5423. Langei.
 5981. Affine.
 6207. Humboldtianum.
 8026. Adoperiens.
 8029. Humboldtianum.
 8476. Plicatulum.
 9200. Squamulatum.

RAMOS, M.

- 1385 (BS). Conjugatum.
 1700. Conjugatum.
 8224 (BS). Conjugatum.

REGNELL, A. F.

- III. 1340. Malacophyllum.
 III. 1341. Paniculatum.
 III. 1344. Stellatum.

RENSON, C.

353. Notatum.

24483—29—20

REVERCHON, J.

85. Pubiflorum glabrum.
 87. Stramineum.
 1066. Bifidum.
 1067. Distichum.
 1068. Stramineum.
 2214. Circulare.
 2217. Pubiflorum glabrum.
 2217 A. Pubiflorum.
 2832. Ciliatifolium.
 2832 A. Stramineum.
 3455. Dilatatum.
 3464. Laeve.
 3468. Ciliatifolium.
 4174. Langei.
 4176. Langei.
 4180. Urvillei.
 4180 A. Urvillei.

RICKER, P. L.

844. Dilatatum.
 852. Floridanum.
 853. Giganteum.
 888 A. Longepedunculatum.
 889. Plicatulum.
 902. Distichum.
 906. Setaceum.
 910. Floridanum.
 912. Pubescens.
 947. Distichum.
 967. Setaceum.
 969. Pubescens.

RICKSECKER, A. E.

223. Conjugatum.
 238. Fimbriatum.
 410. Laxum.
 433. Distichum.
 434. Secans.

RIDGWAY, ROBERT

2867. Repens.
 3250. Circulare.
 3314. Circulare.
 3344. Repens.

RIDLEY, H. N.

3. Blodgettii.
 5. Plicatulum.
 6. Fimbriatum.

RIECKEN, WILLIAM

19. Pubiflorum₁glabrum.

RIEDEL, L.

29. Multicaule.
964. Pumilum.
968. Vaginatum.

ROBINSON, C. B.

1653. Conjugatum.
6249 (BS). Conjugatum.
9294 (BS). Conjugatum.
9973 (BS). Conjugatum.

ROCA, M.

7287. Vaginatum.

RODRIGUES

5413. Conjugatum.

ROIG, J. T.

3204. Laxum.
3255. Saugetii.

ROIG, J. T., AND CREMATA, M.

2116. Rupestre.

ROJAS

37. Notatum.
104. Squamulatum.
105. Humboldtianum.

ROJAS, TEODORO

114. Plicatulum.
322. Distichum.
1006. Notatum.
1014. Repens.
1688. Fasciculatum.
2313. Unispicatum.
2316. Plicatulum.
2720. Plicatulum.
2730. Plicatulum.
2743. Unispicatum.
2757. Stellatum.
2778. Alcalinum.
2783. Plicatulum.
2787. Plicatulum.
2788. Malacophyllum.
3350. Orbiculatum.

ROLFS, P. H.

266. Supinum.
767. Lentiferum.
800. Ciliatifolium.
819. Boscianum.
820. Floridanum.
983. Pubescens.

ROSE, F. M.

42802. (Forest Serv.). Stramineum.

ROSE, J. N.

1543. Paniculatum.
1885. Plicatulum.
1961. Leptachne.
2781. Convexum.
3294. Plicatulum.
3602. Pubiflorum.
18742. Racemosum.
22075. Paniculatum.
22162. Racemosum.
22582. Candidum.
22639. Humboldtianum.
22645. Saccharoides.
22957. Candidum.
23219. Candidum.
24017. Racemosum.
24022. Racemosum.
24025. Racemosum.
24027. Humboldtianum.

ROSE, J. N., FITCH, W. R.,
and RUSSELL, P. G.

3409. Fimbriatum.
3532. Fimbriatum.
4079. Saugetii
4169. Paniculatum.

ROSE, J. N., PAINTER, J. H.
and ROSE, J. S.

8555. Consersum.
9059. Lividum.
9383. Langei.
9455. Tenellum.
10050. Conjugatum.
10203. Humboldtianum.

ROSE, J. N., STANDLEY, P. C.,
AND RUSSELL, P. G.

12832. Humboldtianum.
14229. Paniculatum.
14859. Squamulatum.

ROTHROCK, J. T.

59. Distichum.

ROVIROSA, J. N.

44. Repens.
260. Fasciculatum.

RUDATIS, H.

1564. Vaginatum.

RUGEL, F.

- 15. Caespitosum.
- 46. Vaginatum.
- 49. Caespitosum.
- 183. Supinum.
- 188. Vaginatum.
- 368. Praecox.
- 384. Ciliatifolium.
- 392. Vaginatum.
- 442. Longepedunculatum.
- 449. Vaginatum.
- 753a. Alterniflorum.
- 869. Bakeri.

RUNYON, ROBERT, AND THARP, B. C.

- 4028. Langei.

RUSBY, H. H.

- 11. Decumbens.
- 198. Paniculatum.
- 205. Humboldtianum.
- 213. Virgatum.

RUSBY, H. H., AND PENNELL, F. W.

- 1014. Trachycoleon.
- 1121. Virgatum.
- 1177. Conjugatum.

RUSBY, H. H., AND SQUIRES, R. W.

- 348. Nutans.
- 356. Fasciculatum.
- 359. Conjugatum.

RUTH, ALBERT.

- 22. Laeve.
- 62. Circulare.
- 77. Boscianum.
- 78. Dilatatum.
- 79. Distichum.
- 80. Laeve.
- 81. Pubescens.
- 82. Pubiflorum glabrum.
- 134. Pubiflorum.
- 249. Dilatatum.
- 258. Floridanum glabratum.
- 259. Floridanum glabratum.
- 300. Pubiflorum.
- 479. Stramineum.
- 490. Stramineum.
- 576. Pubescens.
- 761. Pubiflorum.
- 1000. Floridanum.
- 1442. Floridanum glabratum.

RYDBERG, P. A.

- 1582. Stramineum.

ST. JOHN, HAROLD

- 2576. Setaceum.

SALAS, G.

- 4. Conjugatum.
- 5. Paniculatum.
- 6. Paniculatum.
- 7. Adoperiens.
- 380. Costaricense.

SALZMANN, P.

- 677. Multicaule.

SAMPAIO, A. J.

- 2790. Paniculatum.
- 2919. Conjugatum.
- 4098. Paniculatum.

SANTOS, J. K.

- 29. Conjugatum.

SASAKI, S.

- 21388. Distichum.
- 21418. Conjugatum.

SAVATIER

- 1188. Racemosum.

SAVINIERE, E. DE LA

- 164. Conjugatum.

SCHAFFNER, J. G.

- 136. Humboldtianum.
- 166. Adoperiens.
- 173. Humboldtianum.
- 1073. Distichum.

SCHIEDE, C. J. W.

- 855. Variabile.

SCHOMBURGK, R. H.

- 358. Repens.

SCHOTT, ARTHUR

- 593. Malacophyllum.
- 597. Yucatanum.

SCHROEDER, T. (HERB. OSTEN)

- 18736. Notatum.
- 18742. Plicatulum.

SCHUMANN, W.

1737. Humboldtianum.

SCRIBNER, A. L.

506. Dilatatum.

SCRIBNER, F. L.

14. Laeve.

SEATON, H. E.

61. Distichum.

62. Lividum.

112a part. Botterii.

112a part. Langei.

112b. Notatum.

117. Humboldtianum.

SEIN, BROTHER

321. Secans.

SELER, C. AND E.

5. Pubiflorum.

1359a. Unispicatum.

2442. Humboldtianum.

2576. Conjugatum.

2707. Costaricense.

2715. Paniculatum.

SELLO, F.

74. Plicatulum.

76. Dilatatum.

486. Parviflorum.

781. Plicatulum.

3417. Notatum.

3541. Sanguineolentum.

3567. Urvillei.

5656. Stellatum.

5686. Stellatum.

SERGIUS, BROTHER

2411. Unispicatum.

2682. Unispicatum.

2777. Plicatulum.

SERVINAS, V.

16878. (BS). Conjugatum.

SETCHELL, W. A.

506a. Conjugatum.

550. Conjugatum.

SETCHELL, W. A., AND PARKS, H. E.

50. Paniculatum.

84. Conjugatum.

370. Paniculatum.

SEYMOUR, F. C.

1041. Pubescens.

SHAFFER, J. A.

38. Conjugatum.

707. Fimbriatum.

2476. Fimbriatum.

2569. Laxum.

2578. Caespitosum.

2874. Distachyon.

2905. Distachyon.

3394. Virgatum.

3415. Secans.

3951. Saugetii.

7729. Rupestre.

7732. Distortum.

9025. Conjugatum.

10862. Multicaule.

11804. Conjugatum.

SHAFFER, J. A., AND LÉON, BROTHER

13539. Paniculatum.

13677. Minus.

SHANTZ, H. L.

366. Vaginatum.

SHELDON, E. P.

11305. Distichum.

SIEBER, F. W.

11. Virgatum.

20. Vaginatum.

27. Vaginatum.

II. 29. Nutans.

143. Paniculatum.

366. Conjugatum.

367. Vaginatum.

SIMPSON, J. H.

97. Langei.

184. Blodgettii.

SINGAPORE BOTANIC GARDENS

1324. Conjugatum.

SINTENIS, P.

- 99. Conjugatum.
- 358. Plicatulum.
- 1223 part. Millegrana.
- 1229. Orbiculatum.
- 1720. Distichum.
- 2451. Molle.
- 2509. Paniculatum.
- 2539. Secans.
- 3612. Plicatulum.
- 2715. Distichum.
- 4766. Fimbriatum.
- 6857. Vaginatum.

SMALL, J. K.

- 5470. Ciliatifolium.

SMALL, J. K., AND G. K.

- 5429. Blodgettii.

SMALL, J. K., AND CARTER, J. J.

- 611. Blodgettii.
- 1227. Ciliatifolium.
- 1258. Giganteum.
- 2870. Blodgettii.
- 8658. Caespitosum.
- 8823. Caespitosum.
- 8926. Fimbriatum.

SMALL, J. K., AND HELLER, A. A.

- 198. Circulare.
- 199. Supinum.
- 200. Floridanum glabratum.

SMALL, J. K., AND MOSIER, C. A.

- 5677. Caespitosum.
- 5916. Caespitosum.
- 6059. Caespitosum.
- 6460. Caespitosum.

SMALL, J. K., MOSIER, C. A., AND
SMALL, G. K.

- 6458. Supinum.
- 6477. Blodgettii.
- 6485. Blodgettii.
- 6516. Rigidifolium.
- 6519. Supinum.
- 6740. Blodgettii.
- 6764. Giganteum.
- 6893. Distichum.
- 6982. Monostachyum.

SMITH, C. L.

- 933. Notatum.
- 1053. Paniculatum.
- 1054. Plicatulum.

SMITH, C. P.

- 2754. Longipilum.

SMITH, G. W.

- 192. Saccharoides.
- 843. Saccharoides.

SMITH, H. H.

- 124. Melanospermum.
- 125. Virgatum.
- 126. Virgatum.
- 128. Conjugatum pubescens.
- 142. Stellatum.
- 143. Heterotrichon.
- 161. Saccharoides.
- 175. Clavuliferum.
- 178. Conjugatum.
- 179. Vaginatum.
- 214. Microstachyum.
- 215. Paniculatum.
- 2156. Nutans.
- 2157. Decumbens.
- 2158. Multicaule.
- 2159. Distichum.
- 2170. Trachycoleon.
- 2259. Decumbens.
- 2530. Microstachyum.
- 2744. Conjugatum pubescens.
- 2750. Repens.

SMITH, HURON

- 2586. Laeve.

SMITH, J. D.

- 572. Praecox.
- 664. Praecox.
- 4992. Candidum.

SMITH, J. G.

- 562. Orbiculatum.
- 564. Multicaule.
- 573. Conjugatum.
- 631. Conjugatum.

SMYTH, B. B.

- 232. Stramineum.

SODIRO, LUIS

299. *Paniculatum*.
300. *Candidum*.

SOMES, M. P.

223. *Stramineum*.
3606. *Stramineum*.
3631. *Stramineum*.

SPRUCE, R.

22. *Pilosum*.
1460*. *Fasciculatum*.
5959. *Racemosum*.

STAHL, A.

42. *Densum*.

STANDLEY, JEANETTE P.

117. *Lentiferum*.
180. *Longepedunculatum*.
248. *Monostachyum*.

STANDLEY, PAUL C.

1802. *Circulare*.
7674. *Conjugatum*.
8424. *Pubescens*.
8581. *Circulare*.
9080. *Circulare*.
9579. *Circulare*.
9726. *Circulare*.
9769. *Circulare*.
9936. *Stramineum*.
12663. *Ciliatifolium*.
12940. *Longepedunculatum*.
12975. *Lentiferum*.
13073. *Lentiferum*.
14830. *Longepedunculatum*.
18884. *Boscianum*.
18906. *Ciliatifolium*.
19042. *Lentiferum*.
19558. *Plicatulum*.
19787. *Candidum*.
19825. *Conjugatum*.
20495. *Paniculatum*.
20496. *Plicatulum*.
21067. *Paniculatum*.
21086. *Microstachyum*.
21108. *Orbiculatum*.
21482. *Costaricense*.
21493. *Costaricense*.
21716. *Paniculatum*.
22077. *Paniculatum*.

STANDLEY, PAUL C.—Continued

22242. *Paniculatum*.
22287. *Microstachyum*.
22441. *Adoperiens*.
22442. *Paniculatum*.
22486. *Plicatulum*.
22487. *Paniculatum*.
22793. *Paniculatum*.
22824. *Costaricense*.
22874. *Costaricense*.
23090. *Paniculatum*.
23091. *Plicatulum*.
23271. *Adoperiens*.
23285. *Adoperiens*.
23395. *Paniculatum*.
23516. *Paniculatum*.
23559. *Adoperiens*.
23568. *Paniculatum*.
23596. *Adoperiens*.
23605. *Plicatulum*.
23607. *Plicatulum*.
23649. *Paniculatum*.
23650. *Plicatulum*.
23655. *Notatum*.
23798. *Conjugatum pubescens*.
23840. *Paniculatum*.
23841. *Virgatum*.
23860. *Plicatulum*.
23862. *Decumbens*.
23885. *Conjugatum*.
23905. *Decumbens*.
23963. *Paniculatum*.
23978. *Paniculatum*.
24131. *Virgatum*.
24187. *Decumbens*.
24617. *Paniculatum*.
24649. *Paniculatum*.
24719. *Virgatum*.
24724. *Conjugatum*.
24726. *Decumbens*.
24782. *Plicatulum*.
24789. *Paniculatum*.
24914. *Plicatulum*.
25130. *Arundinaceum*.
25138. *Vaginatulum*.
25149. *Plicatulum*.
25205. *Pilosum*.
25265. *Plicatulum*.
25292. *Microstachyum*.
25445. *Nutans*.
25462. *Paniculatum*.
25519. *Paniculatum*.
25651. *Conjugatum*.

STANDLEY, PAUL C.—Continued

25901. Plicatum.
 25997. Paniculatum.
 26049. Nutans.
 26105. Microstachyum.
 26113. Plicatum.
 26114. Paniculatum.
 26338. Virgatum.
 26355. Minus.
 26463. Conjugatum.
 26471. Paniculatum.
 26796. Centrale.
 26820. Paniculatum.
 26874. Plicatum.
 26882. Virgatum.
 26966. Paniculatum.
 27083. Microstachyum.
 27314. Paniculatum.
 27328. Paniculatum.
 27782. Centrale.
 27953. Paniculatum.
 28339. Plicatum.
 28354. Paniculatum.
 28456. Virgatum.
 28482. Repens.
 28583. Fimbriatum.
 28584. Conjugatum.
 28600. Plicatum.
 28617. Paniculatum.
 28783. Paniculatum.
 28979. Plicatum.
 29094. Plicatum.
 29124. Plicatum.
 29142. Microstachyum.
 29299. Decumbens.
 29397. Centrale.
 29705. Plicatum.
 30000. Plicatum.
 30062. Paniculatum.
 30063. Conjugatum.
 30274. Decumbens.
 30432. Orbiculatum.
 30543. Standleyi.
 30752. Centrale.
 30799. Vaginatum.
 30881. Vaginatum.
 31202. Paniculatum.
 31464. Repens.
 31508. Paniculatum.
 31529. Paniculatum.
 31662. Decumbens.
 31784. Virgatum.
 32099. Plicatum.

STANDLEY, PAUL C.—Continued

32267. Paniculatum.
 32268. Candidum.
 32599. Squamulatum.
 32779. Candidum.
 32865. Costaricense.
 32876. Paniculatum.
 33187. Squamulatum.
 33289. Paniculatum.
 33292. Squamulatum.
 34211. Squamulatum.
 35180. Dilatatum.
 36702. Paniculatum.
 37003. Paniculatum.
 37288. Minus.
 39016. Candidum.
 39018. Paniculatum.
 40953. Paniculatum.
 41256. Candidum.
 41278. Costaricense.
 41583. Squamulatum.
 41606. Candidum.
 42488. Convexum.
 52831. Paniculatum.
 52837. Microstachyum.
 53039. Ciliatifolium.
 53161. Microstachyum.
 53253. Orbiculatum.
 53315. Conjugatum.
 53464. Propinquum.
 53591. Millegrana.
 53748. Paniculatum.
 53796. Propinquum.
 54231. Propinquum.
 54484. Notatum.
 54784. Microstachyum.
 55851. Multicaule.
 55966. Notatum.
 55996. Stellatum.
 56028. Nutans.
 56212. Umbratile.
 56246. Humboldtianum.
 56275. Stellatum.
 56576. Orbiculatum.
 56737. Langei.

STANDLEY, P. C., AND BOLLMAN, H. C.

10098. Circulare.
 10431. Laeve.

STANDLEY, P. C., AND TORRES, R.

47709. Nutans.
 47838. Candidum.

STANDLEY, P. C., AND VALERIO, J.

43214. Candidum.
 45024. Paniculatum.
 46554. Paniculatum.
 46755. Decumbens.
 50012. Squamulatum.
 50018. Candidum.
 50626. Candidum.

STEINBACH, JOSÉ

5160. Conjugatum.
 5273. Notatum.
 5459. Melanospermum.
 6618. Humboldtianum.
 6644. Humboldtianum.
 6835. Distichum.
 6836. Conjugatum.
 6873. Plicatum.
 6898. Densum.
 7020. Notatum.
 7036. Plicatum.
 7103. Stellatum.

STEINBACH, JOSÉ (HERB. OSTEN)

14954. Pictum.
 14959. Notatum.

STEVENS, G. W.

21. Stramineum.
 814. Stramineum.
 1120. Distichum.
 1310. Pubescens.
 1669. Stramineum.
 2128. Repens.
 2302. Floridanum.
 3217. Pubescens.
 4411. Repens.

STEVENSON, J. A.

2292. Laxum.
 2454. Clavuliferum.
 3219. Conjugatum.
 5389. Distichum.

STEWART, ALBAN

1312. Conjugatum.
 1313. Conjugatum.
 1314. Conjugatum.
 1316. Conjugatum.

STONE, WITMER

377. Praecox.
 8232. Longipilum.
 10743. Circulare.

STORK, H. E.

53. Minus.
 279. Paniculatum.

STUCKERT, TEODORO

37. Unispicatum.
 364 (Kneucker Gram.). Notatum.
 365 (Kneucker Gram.). Urvillei.
 367 (Kneucker Gram.). Unispicatum.
 665 (Kneucker Gram.). Malacophyl-
 lum.
 1875. Humboldtianum.
 5416. Urvillei.
 5977. Notatum.
 10793. Urvillei.
 11048. Notatum.
 12664. Notatum.
 12917. Urvillei.

STÜBEL, A.

190. Contractum.

SUKSDORF, W. N.

423. Distichum.
 1612. Distichum.
 1971. Dilatatum.
 2981. Distichum.
 3213. Distichum.

SWALLEN, JASON

142. Ciliatifolium.
 152. Rigidifolium.
 172. Ciliatifolium.
 177. Longepedunculatum.
 178. Longipilum.
 230. Urvillei.
 234. Laeve.
 246. Vaginatum.
 249. Ciliatifolium.
 259. Longepedunculatum.
 266. Debile.
 271. Distichum.
 275. Praecox.

SWALLEN, JASON—Continued

276. *Lentiferum*.
 331. *Supinum*.
 340. *Ciliatifolium*.
 341. *Debile*.
 349. *Setaceum*.
 369. *Laeve*.
 384. *Plicatulum*.
 388. *Laeve*.
 402. *Setaceum*.
 411. *Dilatatum*.
 416. *Longipilum*.
 423. *Supinum*.
 446. *Lentiferum*.
 450. *Setaceum*.
 453. *Plicatulum*.
 461. *Ciliatifolium*.
 496. *Dilatatum*.
 497. *Plicatulum*.
 499. *Distichum*.
 506. *Setaceum*.
 532. *Laeve*.
 536. *Supinum*.
 538. *Longipilum*.
 543. *Dilatatum*.
 547. *Pubiflorum glabrum*.
 561. *Ciliatifolium*.
 980. *Stramineum*.
 994. *Pubescens*.
 1033. *Ciliatifolium*.
 1053. *Hartwegianum*.
 1117. *Distichum*.
 1144. *Dilatatum*.

SYDOW, H.

6. *Langei*.

TABOR, PAUL

39. *Debile*.
 40. *Praecox*.

TATE, G. H. H.

157. *Contractum*.
 296A. *Contractum*.

TAYLOR, A. A.

38. *Plicatulum*.
 40. *Insulare*.
 41. *Rottboellioides*.
 42. *Virgatum*.

TEJADA, R.

344. *Conjugatum*.

THARP, B. C.

1293. *Pubiflorum*.
 1294. *Pubiflorum*.
 1407. *Lividum*.
 1732. *Vaginatum*.
 1748. *Pubiflorum*.
 1768. *Stramineum*.
 2005. *Pubiflorum*.
 2012. *Floridanum glabratum*.
 2014. *Laeve*.
 2016. *Circulare*.
 2024. *Langei*.
 3097. *Floridanum*.
 3105. *Lentiferum*.
 3112. *Monostachyum*.
 3225. *Acuminatum*.
 3262. *Plicatulum*.
 3928. *Stramineum*.
 4142. *Stramineum*.
 4147. *Distichum*.
 4254. *Repens*.
 4259. *Langei*.
 4765. *Monostachyum*.
 5235. *Setaceum*.

THIEME, C.

374. *Conjugatum*.
 5592. (Dist. Smith). *Conjugatum*.
 5593. (Dist. Smith). *Plicatulum*.
 5594. *Paniculatum*.

THOLLON

692. *Vaginatum*.

THOMPSON, J. B.

2. *Fimbriatum*.
 23. *Distichum*.
 26. *Conjugatum*.
 242. *Distichum*.
 254. *Plicatulum*.
 294. *Conjugatum*.
 382. *Paniculatum*.
 449. *Laxum*.
 463. *Laxum*.

THURN, E. F., IM

262. *Contractum*.

TONDUZ, A.

- 15. Decumbens.
- 220. Fasciculatum.
- 267. Paniculatum.
- 306. Notatum.
- 362. Microstachyum.
- 683. Notatum.
- 685. Tenellum.
- 702. Lividum.
- 750. Humboldtianum.
- 752. Notatum.
- 758. Conjugatum.
- 769. Costaricense.
- 2851. Squamulatum.
- 2860. Conjugatum.
- 3017 part. Convexum.
- 3017 part. Costaricense.
- 3364. Conjugatum.
- 3649. Decumbens.
- 3686. Decumbens.
- 4197. Paniculatum.
- 4470. Multicaule.
- 4471. Minus.
- 4472. Plicatulum.
- 4474. Multicaule.
- 4862. Conjugatum.
- 4863. Plicatulum.
- 4869b. Multicaule.
- 4880. Decumbens.
- 6548. Lineare.
- 6946. Paniculatum.
- 7193. (Dist. Smith). Candidum.
- 7225. Fasciculatum.
- 8038. Costaricense.
- 8492. Candidum.
- 8691. Virgatum.
- 8821. Paniculatum.
- 8822. Distichum.
- 8824. Notatum.
- 8828. Conjugatum.
- 9395. Dilatatum.
- 9854. Candidum.
- 11395. Distichum.
- 11402. Conjugatum.
- 11767 part. Costaricense.
- 11767 part. Tonduzii.
- 12623. Squamulatum.
- 12992. Decumbens.

TORO, R. A.

- 38. Conjugatum.
- 152. Plenum.

TORO, R. A.—Continued

- 184. Saccharoides.
- 569. Plenum.
- 675. Candidum.

TORRES, RUBÉN.

- 14. Candidum.

TRACY, S. M.

- 19. (Seymour Dist.). Dilatatum.
- 21. Ciliatifolium.
- 23. Floridanum.
- 25. Circulare.
- 35. Setaceum.
- 66. Vaginatum.
- 97. Pubiflorum glabrum.
- 100. Difforme.
- 113. Pubescens.
- 116. Lentiferum.
- 117. Lentiferum.
- 118. Floridanum glabratum.
- 119. Boscianum.
- 121. Supinum.
- 128. Dissectum.
- 130. Floridanum.
- 147. Pubescens.
- 154. Lentiferum.
- 438a. Ciliatifolium.
- 1411. (Dist. Pollard.) Boscianum.
- 1412. Urvillei.
- 1530. Circulare.
- 1533. Circulare.
- 1560. Floridanum.
- 1561. Laeve.
- 1571. Laeve.
- 1886. Laeve.
- 1887. Laeve.
- 1891. Ciliatifolium.
- 1892. Laeve.
- 1893. Setaceum.
- 1895. Setaceum.
- 1896. Laeve.
- 2026. Praecox.
- 2040. Floridanum.
- 2048. Praecox.
- 2049. Floridanum glabratum.
- 2860. Laeve.
- 2864. Lentiferum.
- 2870. Ciliatifolium.
- 3662. Supinum.
- 3663. Boscianum.

TRACY, S. M.—Continued

- 3664. Floridanum.
- 3665. Lentiferum.
- 3666. Praecox.
- 3666a. Lentiferum.
- 3667. Laeve.
- 3668. Floridanum.
- 3669. Floridanum.
- 3670. Longipilum.
- 3671. Floridanum.
- 3672. Laeve.
- 3673. Plicatulum.
- 3676. Floridanum.
- 3677. Longipilum.
- 3678. Laeve.
- 3679. Ciliatifolium.
- 3680. Ciliatifolium.
- 3681. Laeve.
- 3683. Lentiferum.
- 3684. Floridanum.
- 3685 part. Dilatatum.
- 3685 part. Laeve.
- 3686. Plicatulum.
- 3687. Circulare.
- 3688. Ciliatifolium.
- 3689. Floridanum.
- 3690 part. Floridanum.
- 3690 part. Floridanum glabratum.
- 3691. Floridanum glabratum.
- 3692. Floridanum.
- 3693. Floridanum glabratum.
- 3694. Floridanum.
- 3739. Longipilum.
- 3740. Longipilum.
- 3741. Ciliatifolium.
- 3743. Floridanum.
- 3744. Lentiferum.
- 3774. Plicatulum.
- 3775. Laeve.
- 3792. Longipilum.
- 3795. Floridanum glabratum.
- 3865. Lentiferum.
- 3866. Laeve.
- 3867. Praecox.
- 3959. Boscianum.
- 4499. Praecox.
- 4500 part. Praecox.
- 4500 part. Lentiferum.
- 4501. Ciliatifolium.
- 4503. Ciliatifolium.
- 4504. Setaceum.
- 4505. Floridanum.
- 4507. Dissectum.
- 4509. Plicatulum.

TRACY, S. M.—Continued

- 4623. Vaginatam.
- 4624. Laeve.
- 4625. Laeve.
- 4626. Laeve.
- 4627. Lentiferum.
- 4628. Ciliatifolium.
- 4629. Boscianum.
- 4630. Boscianum.
- 4631. Supinum.
- 4632 part. Debile.
- 4632 part. Longepedunculatum.
- 4632 part. Pubescens.
- 4632a. Debile.
- 6454. Caespitosum.
- 6466. Vaginatam.
- 6472. Lentiferum.
- 6705. Giganteum.
- 6717. Giganteum.
- 6718. Caespitosum.
- 6728. Ciliatifolium.
- 6737. Lentiferum.
- 7016. Floridanum.
- 7032. Caespitosum.
- 7035. Giganteum.
- 7049. Urvillei.
- 7107. Dilatatum.
- 7192. Caespitosum.
- 7201. Ciliatifolium.
- 7369. Langei.
- 7370. Dilatatum.
- 7388. Distichum.
- 7391. Lividum.
- 7395. Monostachyum.
- 7397. Lividum.
- 7398. Floridanum.
- 7401. Lentiferum.
- 7406. Pubiflorum.
- 7750. Repens.
- 7936. Distichum.
- 7937. Stramineum.
- 7938. Pubiflorum.
- 8024. Floridanum.
- 8027. Setaceum.
- 8040. Laeve.
- 8212. Floridanum.
- 8231. Pubiflorum glabrum.
- 8395. Lividum.
- 8602. Floridanum glabratum.
- 8603. Plicatulum.
- 8848. Floridanum.
- 8851. Caespitosum.
- 8887. Pubiflorum.
- 9051. Plicatulum.

TRACY, S. M.—Continued

- 9052. Plicatum.
- 9054. Monostachyum.
- 9056. (Florida) Blodgettii.
- 9056. (Cuba) Distichum.
- 9087. Caespitosum.
- 9093. Minus.
- 9105. Alterniflorum.
- 9117. Plicatum.
- 9118. Notatum.
- 9119. Lividum.
- 9120. Virgatum.
- 9121. Millegrana.
- 9122. Virgatum.
- 9123. Virgatum.
- 9124. Virgatum.
- 9125. Arundinaceum.
- 9126. Arundinaceum.
- 9127. Virgatum.
- 9306. Ciliatifolium.
- 9319. Monostachyum.
- 9383. Longepedunculatum.
- 9385. Longepedunculatum.
- 9388. Lentiferum.
- 9390. Monostachyum.

TRACY, S. M., AND BALL, C. R.

- 20. Laeve.
- 23. Laeve.
- 25. Praecox.
- 26. Praecox.
- 27. Lentiferum.
- 28. Floridanum.
- 29. Floridanum.
- 30. Floridanum glabratum.
- 31. Floridanum.
- 32. Difforme.
- 33. Pubescens.
- 37. Rigidifolium.

TRACY, S. M., AND LLOYD, C. G.

- 435. Floridanum.
- 450. Floridanum.
- 465. Distichum.
- 477. Urvillei.

TRIANA, J. J.

- 258. Candidum.

TRINIDAD BOTANICAL GARDEN

- 2262. Coryphaeum.
- 2271. Decumbens.

TÜRCKHEIM, H. VON

- 66 (Dist. Smith). Boscianum.
- 161. Affine.
- 440. Costaricense.
- 459. Plenum.
- 658 (Dist. Smith). Costaricense.
- 3773. Lentiginosum.
- 3790. Humboldtianum.
- 3791. Plenum.
- 3830. Convexum.
- 3837. Plicatum.
- 7697 (Dist. Smith). Minus.
- 7793 (Dist. Smith). Paniculatum.
- 7794 (Dist. Smith). Decumbens.
- 7795 (Dist. Smith). Boscianum.
- 8793 (Dist. Smith). Minus.
- 8798 (Dist. Smith). Decumbens.
- II. 181. Fasciculatum.
- II. 951. Decumbens.
- II. 1210. Lividum.
- II. 1452. Decumbens.

ULE, ERNST

- 29. Contractum.
- 973. Paniculatum.
- 1614. Plicatum.
- 8033. Contractum.
- 8479. Contractum.

UMBACH, L. M.

- 807 (Kneucker Gram.). Stramineum.
- 4178. Stramineum.

UNDERWOOD, L. M. AND GRIGGS, R. F.

- 147. Plicatum.
- 149. Millegrana.
- 175. Conjugatum.
- 576. Fimbriatum.
- 794. Virgatum.

VAN HERMAN, H.

- 142. Millegrana.
- 347. Millegrana.

VAUGHAN, R. E.

- A4. Conjugatum.
- A5. Dilatatum.
- A6. Paniculatum.

VELASCO, L. V.

- 3. Plicatum.
- 5. Paniculatum.
- 7. Conjugatum.

VENTURI, S.

63. Notatum.
 1782 part. Urvillei.
 1782 part. Malacophyllum.
 2313. Unispicatum.
 2322. Unispicatum.
 2329. Urvillei.
 2395. Unispicatum.
 3467 (Herb. Parodi). Consersum.
 3727. Malacophyllum.
 3771. Urvillei.
 5711. Malacophyllum.
 5713. Lividum.
 5717. Unispicatum.
 5728. Lividum.
 7098. Notatum.
 7165. Urvillei.
 7198. Lividum.
 7226. Unispicatum.
 7227. Malacophyllum.

VIRLET

1323. Langei.
 1327. Malacophyllum.

VOLKENS, G.

110. Conjugatum.

WARBURTON, C. W.

9. Stramineum.

WARMING, E.

808. Pumilum.
 839. Multicaule.
 1086 B. Gardnerianum.

WEATHERBY, A. G.

15. Laeve.

WEATHERWAX, PAUL

834. Blodgettii.

WEBER, C. M.

1013. Conjugatum.

WESTGATE, J. M.

3122. Blodgettii.
 3460. Lentiferum.
 3621. Lentiferum.

WETMORE, A.

167. Secans.
 176. Millegrana.
 848. Plicatulum.

WHITE, C. T.

285. Conjugatum.

WHITE, H. L.

44. Distichum.

WHITE, O. E.

1499. Densum.

WIDGREN, J. F.

870. Lineare.
 871. Pilosum.
 885. Pectinatum.
 887. Stellatum.

WILCOX, E. N.

56. Stramineum.

WILLIAMS, R. S.

1034. Paniculatum.
 2377. Conjugatum.

WILLIAMS, T. A.

3091. Laeve.
 3093. Pubescens.

WILSON, PERCY

159. Conjugatum.
 227. Virgatum.
 420. Plicatulum.
 421. Plicatulum.
 467. Orbiculatum.
 1006. Conjugatum.
 1277. Conjugatum.
 9404. Conjugatum.

WILSON, P., AND LÉON, BROTHER

2872. Breve.
 11599. Breve.
 11602. Langei.

WOOD, J. M.

6189. Dilatatum.

WOODWARD, R. W., AND BISSELL, C. H.

5846. Circulare.

WOOTON, E. O.

1077. *Distichum*.

WRIGHT, C.

167 part. *Alterniflorum*.
 169. *Dissectum*.
 171. *Pulchellum*.
 176. *Nanum*.
 292 part. *Distichum*.
 298. *Bakeri*.
 766. *Paniculatum*.
 767. *Conjugatum*.
 768. *Plicatulum*.
 769 part. *Caespitosum*.
 769 part. *Lindenianum*.
 798. *Distichum*.
 911. *Distichum*.
 947. *Vaginatulum*.
 1546. *Distichum*.
 2093. *Distichum*.
 3438 part. *Minus*.
 3438 part. *Notatum*.
 3439. *Pulchellum*.
 3440. *Dissectum*.
 3442. *Ciliatifolium*.
 3443 part. *Blodgettii*.
 3443 part. *Caespitosum*.
 3444 part. *Clavuliferum*.
 3444 part. *Saugetii*.
 3445 part. *Rupestre*.
 3445 part. *Saugetii*.
 3446 part. *Arundinaceum*.
 3446 part. *Millegrana*.
 3446 part. *Virgatum*.
 3447. *Densum*.

WRIGHT, C.—Continued

3839. *Plicatulum*.
 3840. *Millegrana*.
 3841. *Alterniflorum*.
 3842. *Nanum*.
 3843. *Wrightii*.
 3844 part. *Multicaule*.
 3845. *Propinquum*.
 3847. *Convexum*.
 3848. *Filiforme*.
 3851. *Decumbens*.
 3854. *Vaginatulum*.
 3864. *Rottboellioides*.
 3866. *Nanum*.

WRIGHT, C., PARRY, C. C., AND
BRUMMEL, H.

607. *Laxum*.
 617. *Laxum*.
 618. *Laxum*.
 620. *Virgatum*.
 630. *Paniculatum*.

WULLSCHLAEGEL, H. R.

593. *Notatum*.
 603. *Secans*.
 697. *Propinquum*.

YATES, H. S.

509. *Conjugatum*.

ZENKER, G.

269. *Conjugatum*.
 4026. *Paniculatum*.

INDEX

[Page numbers of principal entries in heavy-face type. Synonyms in italic]

	Page		Page
Alterniflora group.....	138	<i>Dimorphostachys</i>	7, 8, 10
Amphicarpon.....	162	<i>adopariens</i>	102
<i>Anachyris</i>	8, 228	<i>botterii</i>	110
<i>paspaloides</i>	8, 228	<i>ciliifera</i>	105, 106
<i>setaria</i>	229	<i>drummondii</i>	104, 105, 106
<i>Anachyrium</i>	8	<i>ghiesbreghtii</i>	108, 109
<i>Anastrophus</i>	6, 7	<i>langei</i>	105
<i>compressus</i>	7	<i>monostachya</i>	8, 98
<i>paspaloides</i>	48	<i>oajacensis</i>	47
<i>pectinatus</i>	24	<i>paspaloides</i>	110
<i>Axonopus</i>	6, 7	<i>pedunculata</i>	92
<i>aureus</i>	7	<i>pilosa</i>	98
<i>compressus</i>	7	<i>schaffneri</i>	107, 108, 109
<i>furcatus</i>	46, 48	var. <i>remotiuscula</i>	107
Bahia grass.....	5, 65	<i>variabilis</i>	108, 109
<i>Brachiaria distachya</i>	163	Dissecta group.....	7, 28
<i>extensa</i>	240	Disticha group.....	41
<i>grossaria</i>	108	<i>Echinochloa walteri</i>	40
Brevia group.....	155	Economic species.....	4, 5
Bull-grass.....	4, 227	Elephant grass.....	3
Bull-paspalum.....	4, 227	<i>Eremachyrion</i> , section <i>Paspalum</i>	228
<i>Cabrera</i>	6, 7	<i>Eriochloa</i>	6
Caespitosa group.....	126	<i>sericea</i>	233
Camalote negro.....	178	Fasciculata group.....	176
Capim milhã grande.....	174	Field paspalum.....	180
Capriola.....	6	Filiformia group.....	140
<i>Ceresia</i>	8	Finger grasses.....	9
<i>Ceresia</i> , subgenus.....	7, 15	Floating-paspalum.....	5
<i>elegans</i>	8	Floridana group.....	190
<i>fluitans</i>	8, 32	Flügge, work of	1
<i>Chaetochloa</i>	3	Forage grasses.....	4, 5, 33,
<i>Cleachne</i>	7	49, 56, 59, 65, 84, 170, 174, 178, 180, 183, 185, 227	
Conjugata group.....	162	Fort Thompson grass.....	5, 49
Corcovadensia group.....	111	Fournier, date of Mexicanas Plantas.....	20
Cortaderia.....	4	Foxtail millet.....	3
Cortedero.....	198	Gamalote.....	178
Coryphaea group.....	211	Gardneriana group.....	230
<i>Cymatochloa</i>	8	Genera excluded from <i>Paspalum</i>	6, 7
<i>fluitans</i>	8, 32	Genus, history and limitation of.....	5
<i>pyramidalis</i>	33	Geographical distribution of <i>Paspalum</i>	3
<i>repens</i>	8, 33	Golf grass for Tropics.....	5
<i>Cynodon</i>	6	Hackel, Eduard, herbarium of.....	1
<i>dactylon</i>	9, 160	<i>Harpostachys</i> section of <i>Panicum</i>	91
Dallis grass.....	4, 170	Herbarium, Hackel.....	1
Decumbentes group.....	10, 91	Caen, Institut Botanique.....	1
Digitaria.....	6, 8	Freiburg, Botanische Institut.....	1
<i>conjugata</i>	163	Leiden, Rijks Herbarium.....	1
<i>dilatata</i>	170	Montpellier, Institut Botanique.....	1
<i>disticha</i>	48	Pisa, University.....	1
<i>foliosa</i>	41	<i>Hyparrhenia hirta</i>	9
<i>longiflora</i>	43	Imperata.....	9
<i>paspalodes</i>	46, 47, 48	<i>brasiliensis</i>	9
<i>sanguinalis</i>	9	<i>caudata</i>	237
<i>tristachya</i>	41	<i>hookeri</i>	9
Dilatata group.....	169	Jointgrass	5, 49

	Page	Paspalum—Continued.	Page
Knotgrass.....	5, 49	alterniflorum.....	139
Laevia group.....	2, 7, 178	altissimum.....	193
LeConte, types of.....	32	amazonicum.....	224
Linearia group.....	71	ambiguum.....	137
Livida group.....	53	amphicarpum.....	161
<i>Maizilla</i>	8	amplum.....	188
<i>stolonifera</i>	8, 39	ancylocarpum.....	222
Malacophylla group.....	228	anemotum.....	137
Milium <i>distichum</i>	47	angustifolium LeConte.....	179, 180
<i>latifolium</i>	39	angustifolium Nees.....	71, 72, 73
<i>paspalodes</i>	46, 48	antillense.....	215
Millets.....	3	appendiculatum.....	239
<i>Moenchia</i>	8	appressum.....	239
<i>speciosa</i>	8, 237	approximatum.....	71, 143
Napier grass.....	3	arenarium.....	94
Nolte, Ernst Ferdinand, herbarium of.....	1	arenicolum.....	232
Notata group.....	63	argyrocondylon.....	70
Orbiculata group.....	157	aristatum.....	239
Paniculata group.....	117	arsenei.....	63
Panicum.....	3, 6	arundinaceum.....	197, 206, 208
<i>bicrurulum</i>	68	atrocarpum.....	215
<i>bifidum</i>	233, 234	aureum.....	239
<i>confugatum</i>	163	australe.....	179, 180, 183
<i>cultratum</i>	98	bakeri.....	133
<i>decumbens</i>	92	bicrurulum.....	68
<i>digitaria</i>	48	bicrurum.....	163
<i>digitariae</i>	47	bifidum.....	233
<i>digitarioides</i>	47	biglume.....	39
<i>dissectum</i>	5, 28	bistipulatum.....	32, 33
<i>distachyum</i>	163	blepharophorum.....	22
<i>drummondii</i>	105	blepharophyllum.....	87
<i>fasciculatum</i>	122	blodgettii.....	122, 127
<i>filiforme</i>	141	boivini.....	95
<i>furcellum</i>	72	boscianum.....	4, 6,
<i>humboldtianum</i>	22	191, 221, 224, 225, 226, 227, 228, 238	
<i>hybridum</i>	238	botterii.....	53, 91, 106, 110
<i>laxum</i>	160	brachiatum.....	41
<i>monobotrys</i>	98, 101	bracteatum.....	47
<i>monostachyum</i>	8, 97, 98, 101, 107	breve.....	155
<i>minus</i>	98	brevifolium.....	239
<i>obtectum</i>	22	brunneum.....	225, 226
<i>paniculatum</i>	123	buckleyanum.....	58
<i>paspatiforme</i>	47	bushii.....	82
<i>plicatulum</i>	215	caespitosum Flügge.....	127, 129, 14
<i>polyrrhizum</i>	47	<i>longifolium</i>	129
<i>pseudopaspalus</i>	101, 107	caespitosum Hochst.....	224
<i>saccharoides</i>	8, 236, 237	campestre.....	68, 215
<i>schaffneri</i>	107	candidum.....	10, 36, 37
<i>squamatum</i>	104, 105	capillare.....	239
<i>unispicatum</i>	100	capillifolium.....	148
Parviflora group.....	148	carinatum.....	16
<i>Paspalanthium</i>	8	carolinianum.....	239
<i>stoloniferum</i>	8, 39	caudicatum.....	144
Paspalum.....	4, 7, 170	centrale.....	221
<i>abbreviatum</i>	104, 110	ceresia.....	8
<i>acuminatum</i>	31	chapmani.....	87
<i>acutifolium</i>	132	chepica.....	47
<i>acutum</i>	201, 202	chinense.....	239
<i>adoperiens</i>	101, 104, 105	chrysoblephare.....	239
<i>adpressum</i>	239	ciliatifolium.....	2, 3, 73, 75, 83, 84, 86, 87, 88, 89, 90
<i>affine Bello</i>	123	<i>brevifolium</i>	87
<i>affine Steud</i>	111, 124, 203	<i>dasyphyllum</i>	79
<i>africanum</i>	163	ciliatum H. B. K.....	21, 22
<i>alabamense</i>	233	ciliatum Lam.....	162
<i>alcalinum</i>	59	ciliatum Rottb.....	238
<i>alternans</i>	179	ciliiferum.....	105, 106

Paspalum—Continued.	Page
<i>circularis</i>	4, 183, 184, 185
<i>clavuliferum</i>	151, 152
<i>cognatissimum</i>	154
<i>comosum</i>	223
<i>compressicaule</i>	123
<i>compressum</i> Raf.....	238
<i>compressum</i> Rasp.....	239
<i>confertum</i>	36, 37, 226
<i>conjugatum</i>	5, 162, 163, 229
<i>parviflorum</i>	163
<i>pubescens</i>	168
<i>subcordatum</i>	239
<i>tristachyum</i>	163
<i>consersum</i>	112, 200, 204
<i>contractum</i>	25
<i>convexum</i>	222, 223
<i>corcovadense</i>	111, 134, 135
<i>cordovense</i>	123
<i>coromandelianum</i>	224
<i>coryphaeum</i>	2, 211, 213
<i>costaricense</i>	115, 116
<i>crassum</i>	40
<i>crinitum</i>	59
<i>cubense</i>	239
<i>cujabense</i>	15
<i>cullacatum</i>	103
<i>curtisianum</i>	187
<i>curvistachyum</i>	94
<i>cuyabense</i>	16
<i>cymbiforme</i>	20
<i>cynosuroides</i>	239
<i>dactylon</i>	239
<i>dasyphyllum</i>	79
<i>debile</i> Michx.....	3, 75, 77, 78, 80
<i>debile</i> Muhl.....	74, 75
<i>decumbens</i> Rottb.....	92, 238
<i>decumbens</i> Sagot.....	215
<i>decumbens</i> Swartz.....	92
<i>densum</i>	207, 210
<i>denticulatum</i>	57
<i>depressum</i>	239
<i>didactylum</i>	42
<i>difforme</i>	190
<i>diffusum</i>	238
<i>digitaria</i> C. Muell.....	239
<i>digitaria</i> Poir.....	46, 47
<i>digitatum</i>	239
<i>dilatatum</i>	4, 169, 173
<i>decumbens</i>	170
<i>parviflorum</i>	173, 174
<i>paucispica</i>	170
<i>sacchariferum</i>	170
<i>dimidiatum</i>	7, 29
<i>dispar</i>	96
<i>dissectum</i> L.....	7, 28, 29, 30, 127, 224
<i>dissectum</i> Swartz.....	127
<i>dissectum</i> Walt.....	77
<i>distachyon</i> Poit.....	45
<i>distachyon</i> Willd.....	64
<i>distichophyllum</i>	21
<i>distichum</i>	5, 7, 10, 42, 46, 47, 48, 49, 52
<i>anpinense</i>	42
<i>digitaria</i>	48
<i>littorale</i>	42
<i>nanum</i>	42
<i>paspalodes</i>	48

Paspalum—Continued.	Page
<i>distichum</i> —continued.	
<i>tristachyum</i>	42
<i>vaginatum</i>	42
<i>distortum</i>	141, 142
<i>dolichophyllum</i>	139
<i>dolichopus</i>	76
<i>drummondii</i>	29, 105
<i>dubium</i>	78
<i>echinotrichum</i>	25
<i>economic importance of</i>	3
<i>edmondi</i>	156
<i>effusum</i>	154, 239
<i>eggertii</i>	87, 88
<i>elatum</i>	206
<i>elegans</i>	113
<i>elliottii</i>	48
<i>elongatum</i>	229
<i>epile</i>	87, 88
<i>erectum</i>	189
<i>erianthum</i>	27
<i>eriphorum</i>	76, 169
<i>eristachyum</i>	94
<i>erucaeforme</i>	239
<i>falcula</i>	151, 152
<i>familiare</i>	211, 213
<i>fasciculatum</i>	176, 177
<i>glabratum</i>	177
<i>fernandezianum</i>	47
<i>ferrugineum</i>	113, 169
<i>filiforme</i> Flüge.....	239
<i>filiforme</i> Swartz.....	127, 141, 142
<i>filostachyum</i>	240
<i>fimbriatum</i>	235
<i>flaccidum</i>	138
<i>floribundum</i>	134
<i>floridanum</i> Michx.....	191, 192, 193, 194, 196
<i>glabratum</i>	193, 194
<i>floridanum</i> Trin.....	233
<i>fluitans</i>	32
<i>foliosum</i>	41
<i>fournierianum</i>	240
<i>frankii</i>	32
<i>furcatum</i>	240
<i>filiforme</i>	240
<i>parviflorum</i>	240
<i>villosum</i>	240
<i>fuscatum</i>	238
<i>galmarra</i>	123
<i>gardnerianum</i>	230
<i>oligostachyum</i>	230
<i>vestitum</i>	230
<i>geminum</i>	56
<i>geniculatum</i> Raf.....	239
<i>geniculatum</i> Steud.....	158
<i>giganteum</i>	195
<i>glaberrimum</i>	188, 189
<i>glabratum</i>	194
<i>glabrum</i> Bosc.....	191, 192
<i>glabrum</i> Cassidy.....	240
<i>glabrum</i> Poir.....	134, 135
<i>gracile</i> LeConte.....	214
<i>gracile</i> Poir.....	129
<i>gracile</i> Rudge.....	32, 33
<i>gracile</i> Schlecht.....	17
<i>gracillimum</i>	127
<i>griseum</i>	174

Paspalum—Continued.

	Page
<i>guadaloupense</i>	240
<i>guatemalense</i>	102
<i>guineense</i>	123
<i>haenkeanum</i>	107
<i>hallii</i>	54
<i>hartwegianum</i>	5, 58, 59
<i>helleri</i>	135
<i>hemispermum</i>	222
<i>hemisphericum</i>	122
<i>heterophyllum</i>	129
<i>heteropodium</i>	95
<i>heterotrichon</i>	17
<i>paucispicatum</i>	18
<i>hirsutum</i>	76
<i>hitchcockii</i>	160
<i>horticola</i>	151
<i>maritimum</i>	149
<i>humboldtianum</i>	21, 22
<i>humifusa</i>	240
<i>humile</i>	224
<i>incertum</i>	76
<i>infirmum</i>	78
<i>inflatum</i>	42
<i>inops</i>	222
<i>major</i>	222
<i>insulare</i>	140, 145
<i>intermedium</i>	203
<i>interruptum</i>	233
<i>ischnocaulon</i>	134
<i>jaliscanum</i>	114, 115
<i>jimenezii</i>	159
<i>karwinskyi</i>	208
<i>kearneyi</i>	188, 189
<i>kentuckiense</i>	75
<i>kleinianum</i>	41
<i>koleopodium</i>	135
<i>laeve</i>	2, 4, 179, 180, 183, 185
<i>altissimum</i>	194
<i>angustifolium</i>	179
<i>australe</i>	180
<i>brevifolium</i>	179, 180
<i>circulare</i>	184
<i>floridanum</i>	192
<i>pilosum</i>	182
<i>undulosum</i>	179
<i>laevigatum</i>	192
<i>laeviglume</i>	56
<i>lagascae</i>	118
<i>lanatum</i>	169, 240
<i>lanceaefolium</i>	129
<i>langei</i>	104, 105, 106, 108
<i>lanuginosum</i>	187
<i>larrañagai</i>	174
<i>laticulmum</i>	240
<i>latifolium</i>	86
<i>laxum</i>	134, 135, 136, 138
<i>lamarckianum</i>	135
<i>lecomteanum</i>	179
<i>lenormandi</i>	158
<i>lenticulare</i>	214
<i>lentiferum</i>	58, 187, 192
<i>lentiginosum</i>	120, 121, 203, 208
<i>leoninum</i>	146, 147
<i>leptachne</i>	220
<i>leptocaulon</i>	141
<i>leptos</i>	214

Paspalum—Continued.

	Page
<i>leptostachyum</i>	76
<i>leucocheilum</i>	197
<i>liebmanni</i>	113
<i>lindenianum</i>	140, 141, 142, 143, 146
<i>lineare</i> Fourn.....	104, 129
<i>lineare</i> Swartz.....	141
<i>lineare</i> Trin.....	71, 72
<i>littorale</i>	41, 42
<i>lividum</i>	5, 53, 57, 59
<i>lloydii</i>	95
<i>longepedunculatum</i>	3, 74, 75, 88, 128
<i>longicilium</i>	195
<i>longicuspe</i>	35
<i>longiflorum</i>	43
<i>longifolium</i>	143
<i>longipilum</i>	182, 183, 185
<i>longissimum</i>	163, 195
<i>guadalupense</i>	240
<i>macrophyllum</i>	110
<i>piliferum</i>	110
<i>macrospermum</i>	191, 192
<i>maculatum</i>	150
<i>maculosum rotundiflorum</i>	70
<i>malacophyllum</i>	8, 213, 228
<i>ciliatum</i>	229
<i>glabrescens</i>	228
<i>petiolatum</i>	229
<i>manabiense</i>	39
<i>mandiocanum</i>	116
<i>marginatum</i>	214
<i>megaphyllum</i>	143
<i>melanospermum</i>	215, 224, 227
<i>membranaceum</i>	8, 29
<i>michauxianum</i>	47
<i>villosum</i>	240
<i>microstachyum</i>	154
<i>miliare</i>	134
<i>milioideum</i>	134
<i>millegrana</i>	206, 207
<i>minus</i>	65, 67
<i>modestum</i>	221
<i>molle</i>	129, 131, 132
<i>mononeuron</i>	239
<i>monostachyum</i> Hort.....	101
<i>monostachyum</i> Salzm.....	98
<i>monostachyum</i> Vasey.....	101
<i>monostachyum</i> Willd.....	98
<i>montevidense</i>	214
<i>motembense</i>	219, 221
<i>mucronatum</i>	32
<i>muhlenbergii</i>	83, 86
<i>multicaule</i>	10, 68, 149
<i>multiflorum</i>	214
<i>multispica</i>	123
<i>mutabile</i>	61
<i>nanum</i>	144
<i>natans</i>	32
<i>neesii</i>	72, 73
<i>nelsoni</i>	203
<i>nesiotes</i>	117
<i>notatum</i>	5, 64, 67
<i>latiflorum</i>	64
<i>nutans</i>	94
<i>oajacense</i>	8, 47
<i>oaxacense</i>	47

Paspalum—Continued.

Page

<i>oligostachyum</i>	119, 120
<i>molle</i>	119, 120
<i>pilosum</i>	120
<i>olivaceum</i>	224, 225
<i>orbiculatum</i>	157
<i>oricola</i>	105, 106, 108
<i>orthos</i>	214
<i>ovatum</i>	169, 170, 173
<i>grandiflorum</i>	169, 170
<i>parviflorum</i>	173
<i>pallidum</i>	10
<i>palmeri</i>	109
<i>paniculatum</i>	7, 33, 121, 122, 123
<i>minor</i>	123
<i>rigidum</i>	123
<i>panicum</i>	210
<i>papillosum</i>	149
<i>parviflorum</i> Desv.....	129
<i>parviflorum</i> Rohde.....	152
<i>humilis</i>	153
<i>paspaloides</i>	48
<i>villosum</i>	240
pasture and hay, species furnishing.....	4,
5, 33, 49, 56, 65, 84, 170, 174, 180, 183, 185, 227	
<i>paucispicatum</i>	52
<i>pauperculum</i>	215
<i>altius</i>	215
<i>peckii</i>	97
<i>pectinatum</i>	24
<i>pedunculare</i>	170
<i>pedunculatum</i>	8, 92
<i>phonoliticum</i>	137
<i>pictum</i>	150
<i>pilosum</i> Lam.....	8, 97, 98, 107
<i>pilosum</i> Spreng.....	240
<i>pittieri</i>	151, 152
<i>planifolium</i>	53, 55
<i>plantagineum</i>	134
<i>platense</i>	169
<i>platicaulon</i>	240
<i>platyaxis</i>	207
<i>platycaule</i>	240
<i>platyphyllum</i>	240
<i>plenipilum</i>	182
<i>plenum</i>	202, 203, 208
<i>pleostachyum</i>	137, 138
<i>plicatum</i>	2, 118, 134, 188, 214, 215
<i>intumescens</i>	215
<i>microspermum</i>	224, 225
<i>subrotundum</i>	120
<i>plicatum</i>	215
<i>poiretii</i>	129, 147
<i>polyphyllum</i>	22
<i>polystachium</i>	123
<i>polystachyum</i>	237
<i>portoricense</i>	131
<i>praecox</i>	186, 188, 189
<i>curtisanum</i>	188
<i>praelongum</i>	184, 185
<i>propinquum</i>	86, 89, 90
<i>prostratum</i> Nash.....	80
<i>prostratum</i> Scribn. & Merr.....	35
<i>pygmaeum</i>	36
<i>protensum</i>	94, 95
<i>pruinatum</i>	211, 213
<i>psammophilum</i>	80, 81

as palum—Continued.

Page

<i>pubescens</i> Lag.....	131
<i>pubescens</i> Muhl.....	2, 3, 4, 76, 80, 83, 84, 86, 88
<i>muhlenbergii</i>	83
<i>pubiflorum</i>	4, 53, 56, 215
<i>glabrum</i>	4, 55, 56
<i>glaucum</i>	54
<i>viride</i>	53
<i>pulchellum</i>	231, 232
<i>pumilum</i>	68
<i>punctatum</i>	240
<i>punctulatum</i>	179
<i>purpurascens</i>	226
<i>purpureum</i>	39
<i>purpusii</i>	240
<i>pusillum</i>	157
<i>pyramidale</i>	32, 33
<i>racemosum</i> Lam.....	8, 38
<i>racemosum</i> Nutt.....	233, 240
<i>racemosum</i>	233
<i>raunkiaerii</i>	240
<i>rectum</i>	101
<i>longispicatum</i>	101
<i>reimarioides</i>	42
<i>remotum</i>	54
<i>glaucum</i>	54
<i>renggeri</i>	163
<i>repens</i>	5, 8, 31
<i>reptans</i>	42
<i>reptatum</i>	160
<i>rhizomatosum</i>	135
<i>richardii</i>	134
<i>rigidifolium</i>	90
<i>robustum</i>	113
<i>rocanum</i>	138
<i>rosei</i>	240
<i>rottboellioides</i>	140
<i>rudimentosum</i>	239
<i>rupestre</i>	145, 146, 147
<i>saccharoides</i>	8, 9, 236
<i>saltense</i>	64, 65
<i>salzmanni</i>	119, 120
<i>sanguinale</i>	240
<i>sanguineolentum</i>	27
<i>saugeti</i>	130, 146, 147
<i>saxatile</i>	215
<i>scabriusculum</i>	38
<i>scabrum</i>	38
<i>schaffneri</i>	47, 108
<i>schreberianum</i>	206, 208
<i>sciaphilum</i>	131
<i>scrobiculatum</i>	3, 224, 227, 228
<i>frumentaceum</i>	228
<i>scutatum</i>	235
<i>secans</i>	204, 206
<i>selloi</i>	169
<i>senescens</i>	104
<i>sericeum</i>	240
<i>serotinum</i>	240
<i>serpens</i>	158
<i>serpentinum</i>	70
<i>serratum</i>	30
<i>setaceum</i>	2, 3, 75, 76, 78, 84, 86
<i>ciliatifolium</i>	87
<i>longepedunculatum</i>	75
<i>pubiflorum</i>	109, 110
<i>supinum</i>	79

Paspalum—Continued.	Page	Paspalum—Continued.	Page
<i>sieberianum</i>	163	<i>villosum</i>	240
<i>simpsoni</i>	127	<i>violascens</i>	212, 213
<i>singularis</i>	94	<i>virgatum</i> L.	4,
<i>sinuosum</i>	134	7, 9, 28, 134, 188, 197, 198, 200, 201, 206, 214	
<i>solitarium</i>	101	<i>ciliatum</i>	197
<i>spathaceum</i>	86	<i>glabriusculum</i>	207
<i>splendens</i>	16	<i>jacquinianum</i>	197, 207
<i>sphacelatum</i>	16	<i>linneanum</i>	197
<i>squamatum</i>	42	<i>parviflorum</i>	173
<i>squamulatum</i>	104, 118, 119	<i>platyazon</i>	207
<i>standleyi</i>	153	<i>pubiflorum</i>	173, 174
<i>stellatum</i>	8, 15, 16	<i>purpurascens</i>	226
<i>distachyum</i>	15	<i>schreberianum</i>	206, 207, 208
<i>hirsutum</i>	16	<i>stramineum</i>	197, 206
<i>monostachyum</i>	15	<i>willdenowianum</i>	197
<i>stoloniferum</i>	8, 39	<i>virgatum</i> Walt.	225
<i>stramineum</i>	2, 3, 81, 82	<i>virletii</i>	116
<i>strictum</i>	123, 240	<i>vulnerans</i>	207
<i>strigosum</i>	68	<i>wagnerianum</i>	16
<i>subciliatum</i>	69	<i>walteri</i>	29
<i>sumichrasti</i>	118, 119	<i>walterianum</i>	29
<i>supinum</i> Bosc.	3, 79, 84	<i>wrightii</i>	219, 220, 221
<i>supinum</i> Rich.	239	<i>yaguaronense</i>	225
<i>supinum</i> Rupr.	123	<i>yucatanum</i>	121
<i>supinum</i> Sieber.	95	Paspalum-grass	4, 170
<i>swartzianum</i>	141	Paspalus	7
<i>taphrophyllum</i>	64	Pasture grasses	4,
<i>tardum</i>	188, 189	5, 33, 49, 56, 65, 84, 170, 174, 180, 183, 185, 227	
<i>tectum</i>	29	Pearl millet	3
<i>tenacissimum</i>	135	Pennisetum	3
<i>tenellum</i>	112, 113	Plicatula group	213
<i>bourgaei</i>	113	<i>Pseudoceresia</i> , subsection	7, 28
<i>tenuis</i>	162, 179, 214, 240	Raddi, types of	1
<i>tinctum</i>	62	<i>Reimaria</i>	8
<i>tonduzii</i>	115	<i>acuta</i>	8
<i>trachycoleon</i>	19	<i>candida</i>	8, 36, 37
<i>triglume</i>	239	<i>elegans</i>	8, 231
<i>tristachyon</i>	240	<i>Reimarochloa</i>	8
<i>tristachyum</i>	41, 232	<i>Rupestria</i> group	145
<i>tumidum</i>	40	<i>Sabsab</i>	7
<i>umbratile</i>	132	<i>Saccharum caudatum</i>	9
<i>umbrosum</i>	131	<i>contractum</i>	9
<i>underwoodii</i>	208	<i>dubium</i>	9
<i>undulatum</i>	214	<i>polystachyum</i>	9, 236, 237
<i>undulosum</i>	179	<i>Sanguinaria vaginata</i>	42
<i>uniflorum</i>	240	Setacea group	2, 7, 73
<i>uniseriatum</i>	37	<i>Setaria</i>	3
<i>unispicatum</i>	98, 99, 100	Siltgrass	5, 49
<i>urvillei</i>	4, 169, 173, 198	Soil binders	5, 44, 49
<i>usteri</i>	213	Sour-grass	165
<i>vaginatum</i> Ell.	29	Species, grouping of	7
<i>vaginatum</i> Swartz.	5, 10, 41, 42, 43, 44, 49	Species, subspecies and forms	2
<i>longipes</i>	42	<i>Sporobolus indicus</i>	129
<i>nanum</i>	42, 44	Subspecies, species, and forms	2
<i>pleostachyum</i>	176	<i>Syllepis</i>	9
<i>pubescens</i>	47	<i>polystachya</i>	9, 237
<i>reimarioides</i>	42	<i>ruprechtii</i>	9
<i>vaginiflorum</i>	92	<i>Syntherisma</i>	6
<i>variabile</i>	105, 107, 108	<i>filiforme</i>	141
<i>varians</i>	110	<i>longiflora</i>	43
<i>variegatum</i>	43	<i>sanguinalis</i>	9
<i>vaseyanum</i>	174	Talquezal	198
<i>velutinum</i>	170, 240	Teretological specimens, hitchcockii	160
<i>vestitum</i>	152	<i>humboldtianum</i>	23
<i>villifolium</i>	222	Text figures	3
<i>villosissimum</i>	78	<i>Thrasya cultrata</i>	98

INDEX

XVII

	Page		Page
Tricholaena oblecta	22	Water-grass	4
<i>saccharoides</i>	237	Water-paspalum	4, 5
Type specimens	2	Water weed	5, 33
Vasey grass	4, 174	Weedy species	5, 33, 124, 165
Virgata group	196	<i>Wirtgenia</i>	8
Water-couch	5, 49	<i>paspaloides</i>	8, 228

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CONTRIBUTIONS
FROM THE
UNITED STATES NATIONAL HERBARIUM
VOLUME 28, PART 2

THE AMERICAN SPECIES
OF THIBAUDIEAE

By ALBERT C. SMITH



SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM
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WASHINGTON : 1932

FOR SALE BY THE SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

1932 JUN 1 1932

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM

P R E F A C E

The accompanying paper by Albert C. Smith, assistant curator, New York Botanical Garden, is an account of the American species of the tribe Thibaudieae of the Vacciniaceae, the blueberry family. This group of plants is almost wholly confined to the New World Tropics, ranging from southern Mexico to British Guiana, northwestern Brazil, Bolivia, and Peru. The flowers of many of the species are exceptionally showy and form one of the outstanding features of the vegetation of the higher Andes, where the plants often occur in abundance. Because of their beauty many species have found their way into cultivation in Europe, and many more would without doubt have an equal horticultural value in the United States. In a few the fruit is edible, though it may scarcely be said to form an important part of the native diet.

The present treatment, which is based primarily upon material in the United States National Herbarium, including specimens collected by recent expeditions of the Smithsonian Institution, in two of which the author has participated, takes into account also the specimens found in several other of the larger American herbaria and the historically important collections preserved at Kew and Berlin, which have generously been forwarded on loan. In all, 20 genera and 240 species are recognized. Of these 3 genera and 75 species are here described as new.

FREDERICK V. COVILLE,
Curator, United States National Herbarium.

CONTENTS

	Page
Introduction.....	311
Historical consideration.....	312
Economic consideration.....	315
Geographic distribution.....	316
Morphological discussion.....	317
Relation of Thibaudieae to the family.....	319
Generic groups.....	321
Thibaudia and its allies.....	323
Macleania and its allies.....	325
Siphonandra and its allies.....	327
Cavendishia and its allies.....	330
Descriptive list, with keys.....	331
List of new genera, new species, and new names.....	533
Index to numbered specimens.....	535
Index.....	IX

ILLUSTRATIONS

PLATES

	Facing page
PLATE 1. <i>Lateropora ovata</i> A. C. Smith.....	548
2. <i>Ceratostema lobbii</i> A. C. Smith.....	548
3. <i>Ceratostema spectabile</i> Rusby.....	548
4. <i>Semiramisia speciosa</i> (Benth.) Klotzsch.....	548
5. <i>Englerodoxa calycina</i> (Benth. & Hook.) A. C. Smith.....	548
6. <i>Gonocalyx portoricensis</i> (Urban) A. C. Smith.....	548
7. <i>Periclesia flexuosa</i> A. C. Smith.....	548
8. <i>Macleania amplexicaulis</i> A. C. Smith.....	548
9. <i>Psammisia globosa</i> A. C. Smith.....	548
10. <i>Psammisia ferruginea</i> A. C. Smith.....	548
11. <i>Anthopterus bracteatus</i> A. C. Smith.....	548
12. <i>Thibaudia archeri</i> A. C. Smith.....	548
13. <i>Thibaudia regularis</i> A. C. Smith.....	548
14. <i>Themistoclesia vegasana</i> A. C. Smith.....	548
15. <i>Cavendishia spicata</i> A. C. Smith.....	548
16. <i>Cavendishia obtusa</i> A. C. Smith.....	548
17. <i>Orthaea constans</i> A. C. Smith.....	548
18. <i>Lysiclesia caudata</i> A. C. Smith.....	548
19. <i>Satyria minutiflora</i> A. C. Smith.....	548

TEXT FIGURE

	Page
Figure 143. Probable phylogeny of Thibaudieae.....	322

THE AMERICAN SPECIES OF THIBAUDIEAE

By ALBERT C. SMITH

INTRODUCTION

The attention of the writer was first attracted to the group of plants known as Thibaudieae in 1926 and 1927, at which time he had opportunity to observe them in their natural habitat in the Eastern Cordillera of Colombia. A second trip, to Peru in 1929, furthered this interest and resulted in the addition of specimens of the group to American herbaria. These trips, both of which were under the auspices of the Smithsonian Institution and led by E. P. Killip, added so many specimens of Thibaudieae to the United States National Herbarium that to name them became highly desirable. In addition to these recent collections, a considerable quantity of other unstudied material had accumulated, owing to the efforts of several American collectors, notably Paul C. Standley, in Central America, and F. W. Pennell, H. H. Rusby, E. P. Killip, and J. F. Macbride, in South America.

In attempting to name these specimens it was found that the only comprehensive work on the tribe, that of R. Hoerold in 1909, was quite inadequate, having been based on the specimens in one herbarium only. In preparing the present paper, a task which has occupied much of the writer's time for two years, type material of nearly all previously described species has been seen, a privilege for which he is deeply indebted to Prof. L. Diels, director of the Botanisches Museum, Berlin, and Sir Arthur Hill, director of the Royal Botanic Gardens, Kew. At these two European institutions most of the type specimens had been deposited and were lent to the writer to facilitate his task. In addition it has been a privilege to study the specimens belonging to the Gray Herbarium of Harvard University; the Goeldi Museum of Pará, Brazil; the Field Museum of Natural History; and the New York Botanical Garden. The institutions from which specimens have been studied are thus indicated in citations: Berlin (B), Field Museum (F), Gray Herbarium (G), Goeldi Museum (Go), Kew (K), United States National Museum (N), New York Botanical Garden (Y). To the

directors and curators of the above-mentioned institutions the writer wishes to acknowledge his appreciation of their cooperation.

In addition the writer wishes to thank Dr. William R. Maxon and E. P. Killip for their assistance in the preparation of manuscript, Dr. J. H. Barnhart for his suggestions in certain nomenclatorial questions, and especially Dr. H. A. Gleason for his constant advice and encouragement.

HISTORICAL CONSIDERATION

The first mention of any plant which may be placed in the tribe Thibaudieae as it is at present understood was in 1763, when Adanson¹ published a brief description of the genus *Chupalon*. His mention of the plant, in connection with *Oxycoccus* and *Vaccinium*, is so noncommittal that it can not with certainty be applied to any more recent collection. Probably a species of *Cavendishia* was under consideration; but since no specific description is available, the name may be ignored.

Among authentic genera, the first to be formally described was *Ceratostema*, mentioned at some length by Jussieu² in 1789. Although no species is detailed, the specimen referred to was obviously *Ceratostema peruvianum*, subsequently published by Gmelin.³

During the following years no specimens of Thibaudieae were described, probably because collections from tropical America had not yet reached Europe in any quantity. However, the collections of Ruiz and Pavon in Peru discovered several species referable to this tribe. Unfortunately these specimens were described in the fourth volume of *Flora Peruviana et Chilensis*, which consists of plates only and is very rare. It is a question whether this volume was available at such an early date as 1802, but it seems best to consider this the publication date for those plates that have suitable analyses. The descriptions made use of the generic names *Ceratostema* and *Thibaudia*; the plants figured belong to the genera, as at present constituted, *Ceratostema*, *Siphonandra*, *Psammisia*, *Thibaudia*, and *Cavendishia*. One of the plates (384, top) represents a plant best referred to the tribe Euvaccinieae and not considered here.

Concerning first publication of the generic name *Thibaudia*, the above-mentioned plates, although adequate as specific descriptions, are not considered as establishing the genus.⁴ The first formal de-

¹ Fam. Pl. 2: 164. 1763.

² Gen. Pl. 163. 1789.

³ Syst. Nat. 2: 676. 1791.

⁴ On the subject of the value of plates in generic name determination, see Sprague, "*Oreocnide* vs. *Villebrunea*," in Kew Bull. Misc. Inf. no. 10, 1928.

scription of the genus *Thibaudia* is in St. Hilaire.⁵ This description, from the wording, probably antedates the issue of volume 4 of Ruiz and Pavon. Three species are described, obviously from the manuscript of Ruiz and Pavon, but in two cases the specific names have been slightly altered from those that appear on the plates. For the sake of uniformity, the names on the plates are in this paper considered authentic. The species first mentioned by St. Hilaire, which may be considered the type species of the genus, is *T. melliflora* (or *T. mellifera* according to St. Hilaire).

In the subsequent 30 years a few more species were described under the generic name *Thibaudia*, mostly by Humboldt, Bonpland, and Kunth⁶ in 1818. These species have since been referred to various genera of the tribe; the name *Thibaudia* as applied by authors of this period included all plants referable to the tribe.

In 1836 the generic name *Cavendishia* was introduced by Lindley,⁷ but was not understood as being the common Andean genus by subsequent writers, who continued to neglect it, making necessary a large number of comparatively recent correct binominals.

The following year Hooker described the genus *Macleania*⁸ and several species. At this time species of the tribe were introduced into England as horticultural plants by commercial collectors in South America. These were described by several authors in the following years and frequently were illustrated by elaborate plates. The genus *Anthopterus* was described by Hooker⁹ in 1839.

The most elaborate and comprehensive treatment of the tribe up to this date is by Dunal.¹⁰ He describes all species known to him and adds several new descriptions, applying the names *Ceratostema*, *Thibaudia*, *Cavendishia* (in regard to one species only), *Macleania*, and *Anthopterus* to American members of the tribe. Like his predecessors, Dunal used the name *Thibaudia* in its broadest sense. His descriptions are brief and often inadequate, without comment as to relationships.

Among the authors who described tropical American plants at this period, and among them various Thibaudieae, was Bentham, whose new species, founded on the Hartweg collection, included the genus *Oreanthes*.¹¹

⁵ Expos. Fam. Nat. 362. 1805.

⁶ Nov. Gen. & Sp. 3: 268–275. 1818.

⁷ Bot. Reg. 21: sub pl. 1791. 1836.

⁸ Hook. Icon. Pl. 2: pl. 109. 1837.

⁹ Hook. Icon. Pl. 3: pl. 243. 1839.

¹⁰ DC. Prodr. 7: 552–578. 1839.

¹¹ Pl. Hartw. 140. 1844.

In 1851 Klotzsch¹² published his "Studien über die natürliche Klasse Bicornes Linne," a work whose chief value is in the strict delimitation of genera. The elaborate keys to genera published by Klotzsch are by no means natural, but his conceptions, as borne out by the species which he grouped together, were fundamentally modern. Genera of American Thibaudieae added by him include *Tyria*, *Satyria*, *Orthaea*, *Siphonandra*, *Semiramisia*, *Eurygania*, *Polyboea*, *Proclesia*, *Themistoclesia*, and *Psammisia*. To be sure, not all these genera are maintained at the present time, but on the whole they represent very definite conceptions.

In 1856 Planchon and Linden¹³ published a description using the generic name *Gonocalyx*, which has been neglected or placed in *Ceratostema* by subsequent authors. It is considered a distinct genus in the present treatment. In 1857 Grisebach¹⁴ published a short list of names without descriptions. These names, based on Lechler's collections from Peru, are without notation other than the collector's number; they are here considered *nomina nuda*. In 1863 the Brazilian and eastern Peruvian species were considered by Meissner.¹⁵ Here is described the genus *Riedelia*, which is synonymous with *Satyria*.

Another important contribution to the study of the tribe was published in 1876 by Bentham and Hooker.¹⁶ Here, of course, only the genera are discussed, but the relationships between them are more clearly expressed than in previous works. The only generic name added is *Findlaya*, which is synonymous with *Orthaea*. Previously in the same year Hooker¹⁷ had published the genus *Notopora*.

Between this time and 1909 many species were described by various authors, none of whom considered generic relationships in a way to throw light on their phylogeny. The best treatment is that of Drude,¹⁸ whose key is adequate for general use. Niedenzu¹⁹ studied in some detail the anatomy of the leaf in Ericaceae, the results being published in the form of a key that does not aid the taxonomist to a great extent. Another author whose name is found in this period is Hemsley,²⁰ who published a summary of the Central American species, forming several new combinations in *Cavendishia*. The only genus added about this time was *Rusbya* Britton.²¹

¹² Linnaea 24: 1-88. 1851.

¹³ Gard. Chron. 1856: 152. 1856.

¹⁴ Lechl. Berb. Amer. Austr. 58. 1857.

¹⁵ Mart. Fl. Bras. 7: 125-127, 171-174. 1863.

¹⁶ Gen. Pl. 2: 564-577. 1876.

¹⁷ Hook. Icon. Pl. 12: 53. pl. 1159. 1876.

¹⁸ Engl. & Prantl, Pflanzenfam. 4¹: 53-57. 1891.

¹⁹ Bot. Jahrb. Engler 11: 134-263. 1890.

²⁰ Biol. Centr. Amer. Bot. 2: 271-274. 1881.

²¹ Bull. Torrey Club 20: 68. 1893.

In 1909 Hoerold²² published his "Systematische Gliederung und geographische Verbreitung der amerikanischen Thibaudieen," the most comprehensive treatment of the subject yet presented. After a historical and morphological discussion he gives a key to genera, which shows an understanding of their relationships, followed by keys to the species known to him. This key is incomplete in many places, but serves its purpose to some extent in the identification of specimens. Following is a discussion of geographic distribution, with species listed according to countries. The rest of the paper is occupied with the description of many new species, based on the collections of Sodiro, Triana, Weberbauer, Lehmann, and others. The differences between the fundamental conceptions of genera in Hoerold's paper and in the present treatment are several, and will be brought out in the following pages. The only new genus added by Hoerold was *Englerodoxa*.

Since 1909 many species have been described by several authors, but no consideration of the group as a whole has been undertaken until the present. Authors who have added several species to the growing list of tropical American Thibaudieae are Blake (1922, 1924), Mansfeld (1925), and Fedtschenko and Basilevskaya (1926).

ECONOMIC CONSIDERATION

A great number of species of the tribe Thibaudieae have a horticultural value, in spite of the fact that they are seldom seen in private or public displays. The brilliant red bracts of *Cavendishia*, the long drooping corollas of certain species of *Ceratostema*, and other floral features of various genera make these plants unforgettable to those who have observed them in the mountainous Tropics. In the Andes they form one of the outstanding features of the vegetation, and the compact and colorful little shrubs, such as most species of the group are, should not be difficult to cultivate in greenhouses or in our Southern and Pacific States. In Europe these plants have found their way into cultivation more readily than in North America, and several species were originally described from plants introduced by Lobb, Pearce, and other commercial collectors of the last century. It is to be hoped that in the near future some means will be found of introducing plants of such inherent horticultural value into the United States.

Another, but very minor, economic use of the group is as a food. Several species, mostly from the Andes of Colombia and Ecuador, have fruits that are reported by collectors as edible, but they do

²² Bot. Jahrb. Engler 42: 251-334. 1909.

not form a consequential part of the native fare. Many local names have been reported, some of which serve to designate any member of the group as it has naturally become known to the Indians, while others seem to be applied to only a single species. For instance, in parts of Colombia the name "uva camarona" is used indiscriminately, in Ecuador "hualicon," in Costa Rica "muelas" and "colmillos." These names and others reported by collectors are mentioned under discussions of species.

GEOGRAPHIC DISTRIBUTION

Members of the tribe Thibaudieae are entirely tropical, the American genera being found from southern Mexico southward to northern Bolivia and eastward in South America to British Guiana and northwestern Brazil. A few species grow in the West Indies. As a rule they are found in the higher mountains, at an elevation of 1,000 meters or more, but several have become established at lower elevations. The foothills of the Andes in the upper Amazon Valley, the Pacific slope of the Western Cordillera of Colombia, and the sandstone regions east of Mount Roraima in British Guiana are localities in which certain species are found at low elevations. Fundamentally, however, the tribe may be said to inhabit the Temperate Zone of the American Tropics.

Two Asiatic genera, *Agapetes* G. Don and *Pentapterygium* Kl., have been placed in the tribe Thibaudieae by various authors. They are quite parallel in structure to the American genera, but this situation is more likely due to somewhat parallel evolution than to recent common ancestry. In this paper I have ignored the Asiatic genera on the assumption that neither of them is so closely related to any American genus as the American genera are to each other.

In America the tribe is represented by 20 genera, of which 6 are monotypic, 7 contain from 2 to 6 species, 3 contain from 10 to 20 species, and 4 contain more than 20 species. The total number of species described in this paper is 240, and in addition there are 24 names that I am unable to place. The fact that approximately one-third of the species treated are new must be ascribed to two causes: First, that the group has received no critical treatment for more than 20 years and, second, that the recent interest in South American exploration has yielded an amazing quantity of herbarium material. The situation that prevails in the tribe Thibaudieae is duplicated in any South American group one studies. It is to be anticipated that many unknown species are still to be collected, inasmuch as exploration of the South American Continent, although recently greatly accelerated, has left many localities untouched. For instance, it is practically certain that undiscovered plants of the tribe await collec-

tion in the Andes of northwestern Colombia and in the Pacaraima Mountains of southern Venezuela, to mention only two of the least known and most interesting spots. The total number of species of Thibaudieae will probably reach more than 300 as a result of future collecting.

The center of distribution of Thibaudieae appears to be in the northern Andes, where species are more numerous and more varied than elsewhere. Whether this region was the original home of the tribe is a matter of speculation. The Central American species are fewer in number than the South American, and only in two cases are the same species found in both South and Central America.

The geographic distribution of each genus is discussed in connection with its description. It will be observed that several genera are limited to a small area, while others are found throughout the range of the tribe.

MORPHOLOGICAL DISCUSSION

It is not within the scope of the present treatment of Thibaudieae to discuss morphology in any detail. However, a short discussion of the structure of plants belonging to the tribe may be of some use. All species of this alliance show a great similarity in structure, the most extreme variations taking place in the stamens, which consequently are of most importance in taxonomic consideration.

In habit, Thibaudieae are spreading shrubs, often epiphytic, or low trees. They are inhabitants of the mountainous regions of the Tropics, rarely growing in hot lowlands, more habitually in cool exposed situations. The stems branch below the soil, or sometimes the primary branch is semiprostrate, sending up more or less erect shoots. The branches are as a rule stout and gnarled, clothed with loose grayish bark. Minor branches are numerous and irregular. Often, when the plant is habitually epiphytic, the branches are slender and drooping or even subscandent.

Leaves are usually numerous, variously shaped, entire or subentire, petiolate, coriaceous or thick-coriaceous, rarely chartaceous, pinnate- or pli-nerved, or with several principal nerves spreading from the base. The anatomy of the leaf of this whole family has been studied in great detail by Niedenzu.²³ Stipules are unusual, being present, so far as can be observed from material at hand, only in *Rusbya* and some species of *Ceratostema*.

The inflorescence is axillary, sometimes appearing terminal; the flowers are solitary, in pairs, in small fascicles, in racemes, or in panicles. Form of inflorescence does not appear constant in conjunction with other generic characters, but is generally quite con-

²³ Bot. Jahrb. Engler 11: 134-263. 1890.

stant specifically. Frequently bracts of various size are located at the base of the inflorescence; these reach their maximum development in *Cavendishia*, the only group in which they appear to have a protective function. Small secondary bracts are found at the bases of pedicels, which they subtend. Pedicels are usually bibracteolate, and are sometimes surmounted at the articulation with the calyx by several minute cartilaginous teeth. Like all flower parts, the pedicels may be glabrous or variously pubescent, the degree and type of pubescence being as a rule a constant specific character.

In specific descriptions of Thibaudieae authors have used different terms for parts of the calyx, frequently with no clear comprehension of its anatomy. The calyx of Ericaceae, which is formed by the fused sepals, is inserted on the receptacle below the corolla and ovary. Obviously the same structure is present in Vacciniaceae, except that the calyx has become fused with the wall of the ovary. That this compound structure formed by the fusion of calyx and wall of the ovary is not a stem structure is borne out by a study of its anatomy. The separation of vascular bundles supplying the stamens, corolla, and free portion of the calyx takes place at a level far below the apparent attachment of these organs. Therefore, the point where the swelling of the calyx becomes perceptible (approximately where the first separation of vascular bundles takes place) may be considered the apex of the pedicel and the base of the calyx. In the majority of species of the tribe this point is marked by a more or less conspicuous indentation of tissue, frequently known as the articulation, but sometimes the pedicel leads directly into the calyx without this. The presence or absence of this indentation has no effect on the vascular anatomy, and it appears, therefore, to be a purely external character of little phylogenetic significance.

The parts of the calyx are in this paper designated thus: The portion that is fused with the wall of the ovary is called the *calyx tube*; the free portion, which is erect or spreading, is the *calyx limb*; and the portions of the limb that are free from one another are the *calyx lobes*. The lobes are triangular, ovate, or lanceolate, often reduced to minute apiculate serrations of the limb margin. The tube is short-cylindric, campanulate, obcylindric, or obprismatic, frequently angled or winged. The ovary, in its fusion with the calyx, has become adapted to the shape of that organ; it is fleshy, often thick-coriaceous, and often depressed in the center, at which point it gives rise to the single style, surrounding which is an annular or cup-shaped disk. The locules are as a rule five, thick-walled, and variously shaped. The ovules are numerous and minute, spherical or ellipsoid, attached to a central parietal placenta. Since these organs are constant throughout the tribe, their characters are not repeated

in the following descriptions. The symmetrical stigma, which is single, is truncate, subhemispherical, or peltate.

The corolla and stamens are also structurally fused into the compound wall at their bases, as demonstrated by an examination of vascular structure. Practically, however, they may be considered to have their inception at the base of the calyx limb. At this point they are weakened at maturity and are deciduous, leaving the calyx limb and style persistent upon the fruit. The corolla is tubular, usually subcylindric, frequently contracted to a long and narrow throat, usually carnose, with 5 (sometimes 4 or 6) small lobes, invariably some shade of red in color (or sometimes green or white when young). The stamens, which as a rule are double the number of corolla lobes, have a distinct attachment to the summit of the fusion wall, but they are usually more or less adherent to the corolla and fall from the mature flower with that organ. The filaments are liguliform, carnose or membranous, free or connate in a tube, extended distally into slender connectives which are adherent to the anther sacs dorsally. The anthers are erect, frequently elongate, two-celled, smooth-surfaced or granular, yellow or brown in color, extended into one or two submembranous tubules (vestigial in *Lateropora*) which open by clefts or pores. The stamens show great variation and generic constancy; they have been used as critical characters by taxonomists, and upon them is founded consideration of generic history. Pollen is transferred from anthers to stigma by insects, or by birds in the case of plants that have the corollas greatly elongate. The disk that surmounts the ovary evidently secretes a nectar. In some species of *Vaccinium* it has been ascertained that the plants are self-sterile; in others there is a slight dichogamy to insure cross-pollination. So far as I have been able to discover, no work along these lines has been done with Thibaudieae, but doubtless the same conditions are present.

The fruit of Thibaudieae is a berry or drupe, never very large but frequently used as a food by several primitive tribes. The seeds are small, with fleshy endosperm and straight embryo.

RELATION OF THIBAUDIEAE TO THE FAMILY

It is the purpose of the present paper to consider species and genera within the tribe Thibaudieae as it is understood by modern taxonomists, but a short discussion of the position of the tribe in regard to its family may be of some value. By some authors the family Vacciniaceae is united with the family Ericaceae, a point of view that has much justification. In morphology, anatomy, and habit, the two families are doubtless closely allied; whether they are considered two families or one is immaterial to the present discus-

sion. The family Vacciniaceae may be defined as including those ericaceous genera that have an inferior ovary. It is divided into two tribes, Thibaudieae and Vaccinieae.

Bentham and Hooker distinguish the two groups as follows:

Thibaudieae. Flores magni v. inter majores. Corolla saepissime crasse coriacea v. carnosa. Filamenta brevia v. brevissima, contigua cohaerentia v. connata, rarius discreta.

Euvaccinieae. Flores parvi v. inter minores. Corolla saepius tenuiter coriacea v. membranacea. Filamenta brevia v. elongata, saepissime discreta.

Drude expresses the relationship thus:

Blkr. krugförmig, glockig oder radförmig gespalten. Stb. unter einander getrennt. Frkn. vom Blütenstiel scharf abgesetzt und oft abgegliedert.

Vaccinieae.

Blkr. aus bauchigem Grunde röhrig oder lang cylindrisch, mit kurz 4-5 spaltigem Saum, lederig-fleischig. Stb. getrennt oder zu einer Säule verwachsen. Kelch am Frkn. herablaufend und in den Blütenstiel übergehend (selten abgegliedert) ----- *Thibaudieae*.

From the above it may be concluded that in the minds of these authors no sharp distinction between the tribes is obvious. In fact, whatever difference exists is a matter of degree, and any definition must admit many exceptions. In general, the above analyses, however intangible, are suitable for practical purposes. It may be said that the flowers of Thibaudieae as a rule are larger and more carnosae, and have stamens with shorter filaments than those of Euvaccinieae. Of certain Euvaccinieae the ovary is not so strictly inferior as it is in Thibaudieae. It is probable that most genera of Thibaudieae are further removed from the common ericaceous ancestor than most genera of Euvaccinieae. However, it is a matter of real doubt whether these two tribes are natural, and it is quite conceivable that certain genera, such as *Vaccinium* and *Thibaudia*, are closer in their phylogeny than are *Thibaudia* and, for example, *Satyria*.

In view of this indistinct conception of the two tribes that constitute the family Vacciniaceae, it may be seen that an accurate sketch of generic relationships should await detailed study of all species of the family. However, such a project can not be undertaken at present, and the phylogenetic system here proposed is therefore based upon a supposition that the two tribes are really distinct.

From the tribe Thibaudieae certain genera placed there by previous writers are here excluded. Among these are *Hornemannia*, which, with its short campanulate corolla, is surely allied to *Vaccinium*, *Sophoclesia*, and *Sphyrospermum*, which seem intermediate between the two tribes, but whose alliance, I believe, is really with Vaccinieae, and *Disterigma*, which, as pointed out by Blake,²⁴ is very close to *Vaccinium*.

²⁴ Journ. Washington Acad. Sci. 16: 361. 1926.

GENERIC GROUPS

Within the tribe several divergent strains are apparent. There is conceivably no predominant morphological form from which other groups have separated from time to time, but the primary divergences seem to have been ancient. The order in which these main groups were evolved is, of course, a matter of hypothesis.

There are two monotypic genera, *Lateropora* and *Notopora*, whose inception was undoubtedly more ancient than that of the other genera here considered, although they have little in common other than a vast difference from other groups.

If we disregard this very minor section of the tribe, and take for granted a common source for the other genera, there are apparent four strains, of which *Siphonandra*, *Macleania*, *Thibaudia*, and *Cavendishia* may be considered the representative genera. The relation of these groups to one another, and of the genera within them, is discussed in the following paragraphs.

LATEROPORA

This apparently monotypic genus, previously undescribed, has been found only on the summit of Chiriquí Volcano, in western Panama, a station where it may well have been isolated for a long period. Doubtless it represents a very distinct line of evolution, and to associate it with any other genus is impossible. All other members of the tribe show elongation of the anther tubules, a characteristic that must have been present in a pre-thibaudioid type. The remarkable atrophy of the tubules of *Lateropora* is probably to be considered a very early variation from the type, since it is associated with unusually densely pubescent filaments and laterally dehiscent sacs, characteristics that must have been developed over a very long period of time. In other details of flower structure, leaf character, habit, etc., the genus agrees with other members of the tribe.

NOTOPORA

Like *Lateropora*, this monotypic genus inhabits a mountain range long isolated, having thus far been found only in the vicinity of Mount Roraima in western British Guiana. Its outstanding characteristic is the presence of anther tubules that open by extrorse pores, whereas those of all other genera (except *Lateropora*) open introrsely or apically. The flowers are tomentose to a degree found in no other group of the tribe. The presence of these characters indicates an ancient derivation of the genus, which can not be associated with any other modern group in a discussion of descent.

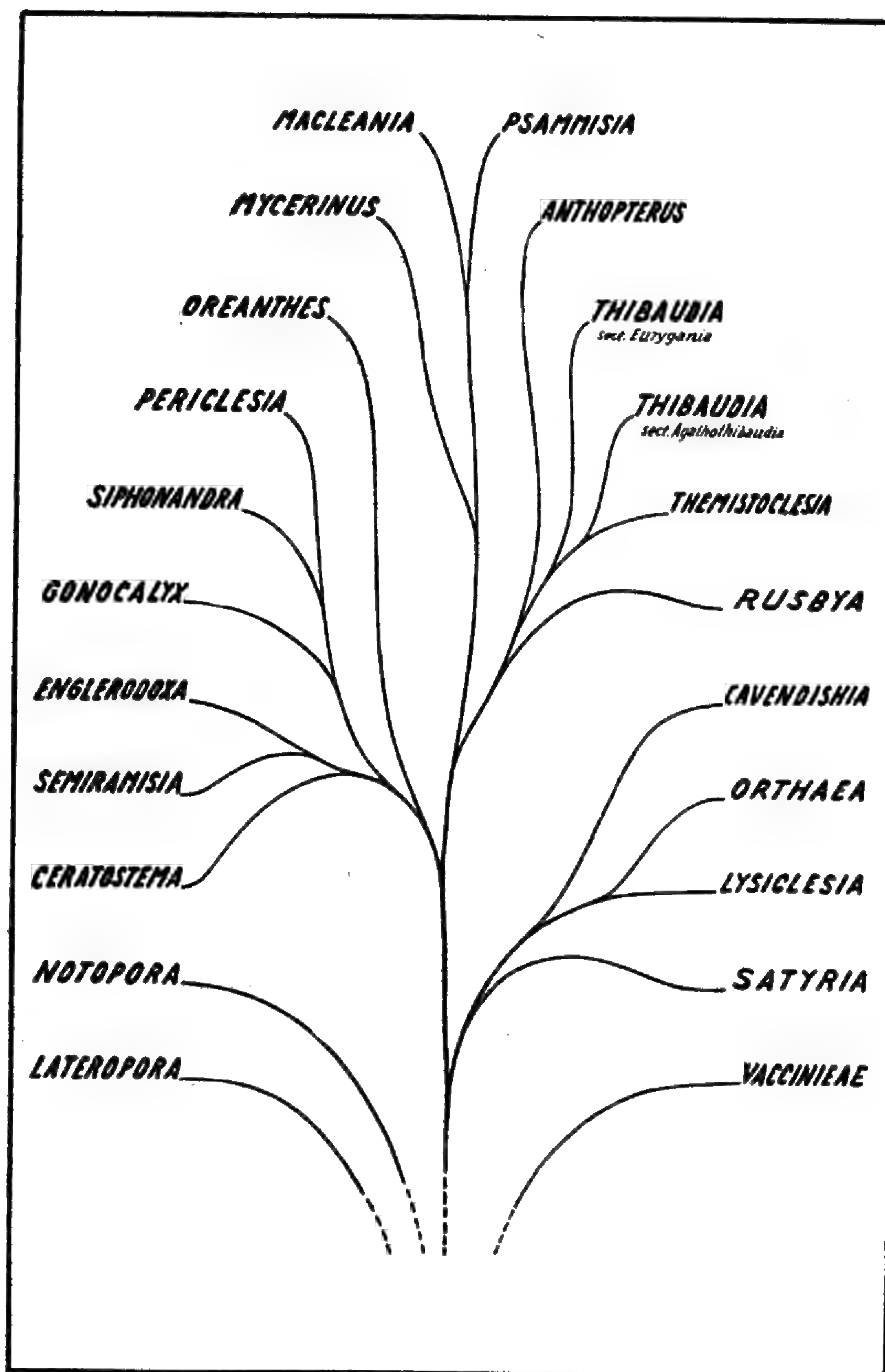


FIGURE 143.—Probable phylogeny of Thibaudieae

This and the preceding genus are quite separate from all the following, and their presence in the tribe may plausibly be questioned. The remaining genera are all closely related, and their derivation from a comparatively recent type stock is to be presumed.

THIBAUDIA AND ITS ALLIES

A discussion of what may be the most primitive group still extant necessarily involves unestablishable hypotheses, since no fossil evidence is available. There are several large genera extant, from each of which small groups have been derived. Of these large genera (*Macleania*, *Psammisia*, *Thibaudia*, and *Cavendishia*), the one that seems the "mean" of the tribe, and that it seems reasonable to consider close to the primitive stock, is *Thibaudia*. Naturally, this is only a theory deduced from study of herbarium and field material, and supported by the facts brought out in this monograph.

THIBAUDIA

The genus that gives its name to the tribe is characterized by cylindric corollas of medium size, stamens always 10 and nearly as long as the corollas, usually smooth anther sacs, and broad rather flexible tubules, which dehisce by elongate introrse clefts. The tubules are typically about as long as or twice as long as the sacs. Within the genus a sharp line may be drawn between those species with articulate calyces and those with continuous calyces. The value of this as a phylogenetic indication has been previously discussed. The number of species with continuous calyces is much smaller than that of species with articulate calyces. The small group has been designated by Hoerold as the subgenus *Agathothibaudia*; it is well marked, and probably represents the derivative section of the genus, since a vast majority of species in the tribe as a whole have articulate calyces and this predominant feature may best be considered the primitive one. The large group has been mentioned by authors as *Eurygania* Klotzsch and *Neothibaudia* Hoer., these two subgenera being maintained by Hoerold on the basis of the shape of the disk and the integrity or serration of the leaf margins. These characters are certainly of no value in the determination of subgenera, since they have only a specific and not a phylogenetic bearing. If the group that may be designated as *Eurygania* is to be divided at all, the best character seems to be whether the filaments are distinct or connate, in which point an incipient divergence is perceptible.

THEMISTOCLESIA

Along the same line of divergence observed in *Agathothibaudia* (with the calyx continuous) lies the small genus *Themistoclesia*.

The type species (*T. pendula*) has isomorphic stamens and on the basis of its flower structure might well be included in *Agathothibaudia*. But the remaining 5 species of the genus have more or less dimorphic stamens, and give rise to the questions whether *Themistoclesia* is a coherent genus, and whether dimorphism of stamens is a character of any phylogenetic value. As to the latter point, my conclusion has been that in *Cavendishia* and its allies dimorphism is an important feature (for reasons given below), but that in *Themistoclesia* and *Rusbya* it is a comparatively recent development, and that these genera have attained their present condition of dimorphism or subdimorphism through a thibaudioid line of evolution. That the species of *Themistoclesia* with dimorphic stamens and those with isomorphic stamens are congeneric is borne out by the two or three intermediate species and by the close agreement of all the species in geographic and habital characters. The habit of the plants is so characteristic (often epiphytic, with small subcordate leaves) that they are here maintained as distinct from *Agathothibaudia*; another reason is to avoid expanding the generic concept of *Thibaudia* to include any plants with dimorphic stamens. So, although the genus *Themistoclesia* is somewhat artificial, it is maintained as distinct in this treatment.

ANTHOPTERUS

The genus *Anthopterus* was considered by Hoerold a subgenus of *Thibaudia*, but it is so distinct in its winged calyces and corollas that there seems no ground for this combination, in view of modern conceptions of generic limits. In fact, *Anthopterus* is one of the few genera that any botanist can name by a glance at external structure. In its continuous calyx it suggests a descent from a thibaudioid ancestor along the line of *Agathothibaudia*, but it seems to have been distinct from the original *Thibaudia* strain longer than the previously mentioned group.

RUSBYA

The last genus that may be considered a fairly recent derivative of a *Thibaudia* stock is *Rusbya*, a monotypic genus from Bolivia. In flower structure this plant resembles *Themistoclesia*, having a continuous calyx and slightly dimorphic thibaudioid stamens. Its distinguishing feature is its linear leaves, a character found nowhere else in the tribe. Structures that apparently are true stipules are present here; they are to be found also in certain species of *Cerátostema*. Like *Anthopterus*, this is a genus that may be distinguished at a glance. It should be noted that the name is maintained only in regard to the type species, *R. taxifolia*.

MACLEANIA AND ITS ALLIES

This group of two large genera and one monotypic genus is closely allied to the *Thibaudia* group. The coherence of these genera and their point of divergence from a thibaudioid ancestor are best shown in the staminal structure. The anther sacs have become more obviously granular-surfaced, and the tubules are reduced in length and diameter. From the cylindric, broad, and rather flexible tubule of the *Thibaudia* group has been derived a subconical, narrow, and stiffly erect tubule. Concomitantly, the corollas, instead of being cylindric, have become as a rule urceolate, much contracted to a long narrow throat. The calyces are always articulated with the pedicels.

MACLEANIA

Macleania is one of the finest examples of a coherent genus from which other genera are in process of being derived. *M. nitida* may be taken as typical of the "average" for the genus; it has a cylindric or campanulate calyx tube, an elongate-urceolate glabrous corolla, and stamens with distinct filaments and with two tubules laterally connate to the apex. In one trend of evolution the filaments have become connate and the tubules have tended to fuse, resulting in the group of species allied to *M. floribunda*. Concomitantly, in some species the calyx tube has become winged, the wings showing varying stages of development, reaching their maximum in *M. pentaptera*, which, however, is approached by *M. cordifolia*. In some specimens of *M. pentaptera*, notably those from the Dagua Valley of Colombia, the corolla lobes have become spurred. Were the intermediate forms (e. g., *M. pentaptera*, from Ecuador, and *M. cordifolia*) unknown, the Dagua specimens of *M. pentaptera* would constitute a genus in the most satisfactory sense of the word.

Another trend in the single-tubuled group is evident in *M. pubiflora* and culminates in *M. salapa*, namely, the development of a dense floral pubescence, the elongation of calyx lobes, the splitting of the filament tube into distinct filaments, and the loss of calyx wings. This species (*M. salapa*) might well be considered generically distinct, and is indeed the basis of *Tyria* Klotzsch.

On the other hand, from the typical *M. nitida* we have forms in which the tubules are distinct in varying degrees, or even to their bases (e. g., some specimens of *M. glabra*). In some of these specimens the connective is faintly thickened distally, a condition from which it is a slight step to the spurred connective of *Psammisia*. Here also are found modern species that it is difficult to place (*P. hookeriana*, *P. penduliflora*, etc.).

It is seen then that in the group known as *Macleania* are several clearly marked trends, resulting in incipient genera, which, if their evolution is carried on under ideal conditions, will eventually become quite distinct. These are typified by *M. nitida*, *M. floribunda*, *M. pentaptera*, *M. salapa*, and the group known as *Psammisia*. Whether among present-day species five genera or two or one are recognized is purely a matter of personal conception. It is here considered that the species so well known as *Psammisia* merit generic recognition, even though the transition from *Macleania* is quite traceable.

PSAMMISIA

Psammisia, as has been mentioned, has probably been derived from an ancestor resembling such modern species of *Macleania* as *M. nitida*. The tubules have remained distinct while retaining their typical elongate-conical shape, and the connectives, which are formed by the distal part of the filaments adhering to the anthers, have developed lateral spurs. Sometimes these are present on the alternate connectives only, sometimes on all the connectives, and rarely on one margin of a connective only. If all the connectives are spurred, there is a slight alternate difference in their shape and in the pronouncement of their spurs. The anthers are crowded into a ring, and a function of the spurs may be to hold the connectives closely coherent to one another.

Within the genus, a large part of the species seem to have maintained the primitive condition, with elongate and rather large corollas. A smaller group of about five species has developed short conical or almost spherical corollas with accompanying stout and short anthers. Several apparently unrelated species throughout the genus have developed partial fusion of calyx lobes.

MYCERINUS

In certain species of *Macleania* the calyx is winged, but the wings (or angles) are opposite the sinuses of the lobes. On Mount Duida, in southern Venezuela, is found a species in which the wings are opposite the lobes and continued to their apices. The relation of this species to the *Macleania* group is borne out by the stout anthers, with short subconical tubules. The tubules are distinct to the base, and are dorsally marked with distal elongations of the connective. To find such unusual features in a plant from this isolated region is not surprising; the species probably represents an early divergence from a primitive *Macleania* stock.

SIPHONANDRA AND ITS ALLIES

In the present group are placed 7 genera with about 30 species. As a whole the group is characterized by isomorphic stamens (except in some species of *Ceratostema*) and anthers usually much elongated, with slender tubules opening by very short introrse or apical pores. Its point of divergence from a thibaudioid ancestor is probably more ancient than that of the *Macleania* group. *Siphonandra*, although it is a small genus, is taken as the "mean" of its group because of its unmistakable characters and the consequent lack of ambiguity when we speak of "siphonandroid" features.

The 7 genera here mentioned are quite distinct among themselves; in fact, the relationships are so remote that their expression in a key or in a racial diagram is purely theoretical. This wide divergence lends weight to a supposition that these genera represent the ends of ancient and not very successful strains. A plausible reason for this racial failure may be found in the impractical length of the anther tubules and the small pores, which may have made pollen dispersal increasingly difficult. It may be pointed out that *Cavendishia*, *Macleania*, and other genera of the tribe, which have been successful from the viewpoints of geographic extent, number of species, and number of individuals, have short tubules and long clefts, permitting easy release of pollen. In the case of *Ceratostema*, the most successful genus included in the present group, most species have become modified toward this end.

SIPHONANDRA

The genus *Siphonandra* is easily recognized by the above-mentioned characters, the filaments firmly connate in a membranous tube, and the 10 anthers dehiscing through long slender tubules opening by strictly terminal pores. The trend toward apical pores here reaches its climax, and a condition is established that is found again only in *Lysiclesia* and some species of *Ceratostema* and *Orthaea* (where it was doubtless derived by distinct and somewhat parallel courses). In *Siphonandra* the calyx is always articulated with the pedicel.

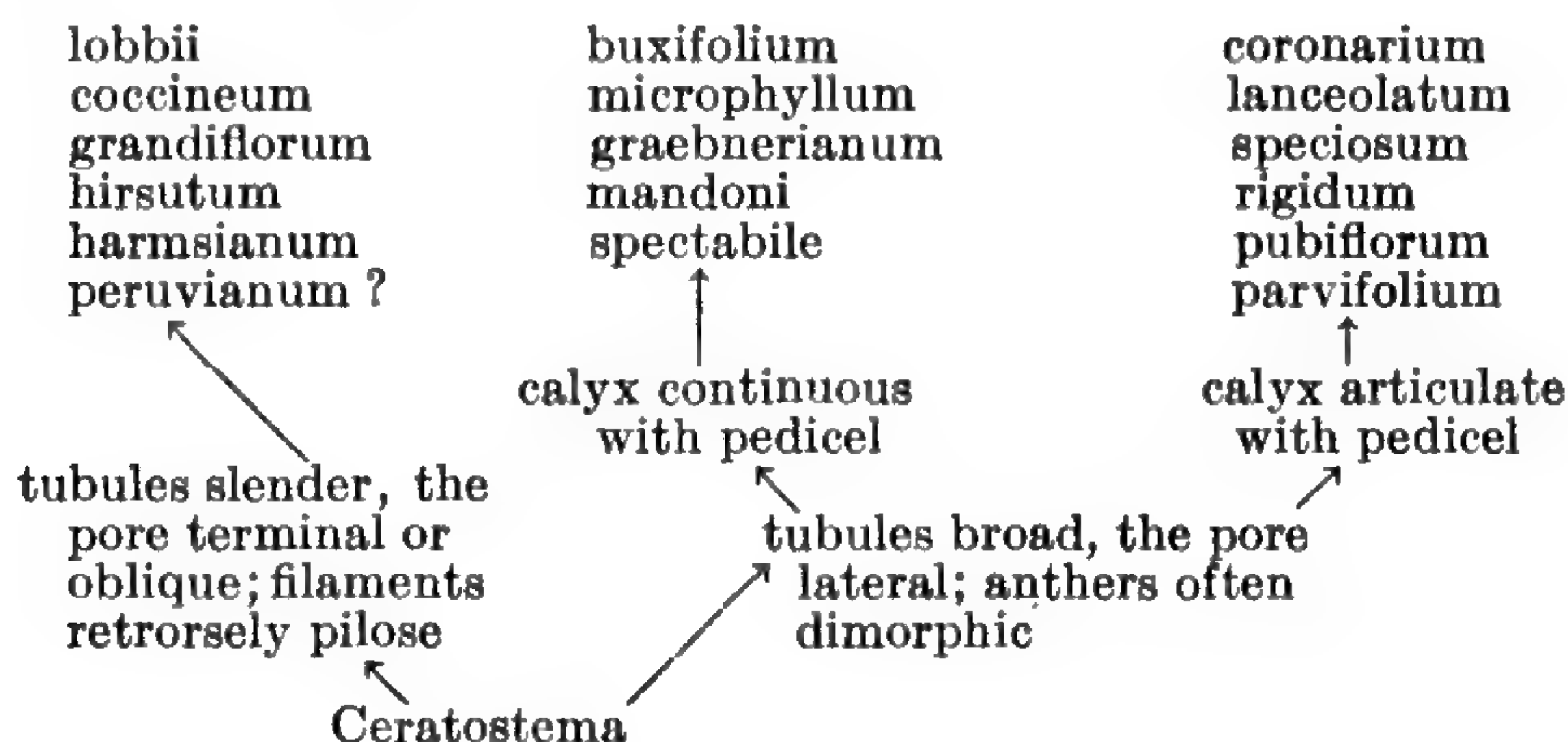
CERATOSTEMA

By all authors except Klotzsch the genera *Ceratostema* and *Siphonandra* have been combined under the former name. Hoerold, in his key to genera, separates *Ceratostema* from *Thibaudia* on the basis of its anther tubules being two to five times as long as the sacs and its stamens being exserted, characters that are not constant for the genus. Whether *Ceratostema* is to be considered a derivative

of a thibaudioid or a siphonandroid ancestor is a question not easy to decide.

On the one hand, there is in *Ceratostema* a group of five or six species with very slender tubules opening by terminal or subterminal pores. These species suggest an unmistakable relationship with *Siphonandra*, from which they differ by their continuous calyces with elongate lobes and their distinct filaments (which are strongly pilose with retrorse hairs). It is apparently the existence of these species that has led students to consider *Siphonandra* congeneric with the remaining species of *Ceratostema*.

On the other hand, the 11 or 12 species that form the second group of *Ceratostema* have anthers suggestive of *Thibaudia*, that is, with flexible tubules opening by clefts of more or less indeterminate length. They differ from *Thibaudia* by their elongate calyx lobes, their usually ample corollas, their elongate tubules, and the occasional presence of stamens of two lengths, as well as by occasional stipules and by habital differences. In this group are found two trends, one in which the calyces are continuous with the pedicels, and one in which they are articulate, a difference which, as has been previously mentioned, is probably of secondary consequence. The relationship of existing species of *Ceratostema* to one another may be expressed in a diagram:



That the above-named species form a coherent genus is indicated by the existence of specimens more or less intermediate between the first and second groups. *C. lobbii* has oblique, almost elongate pores; *C. microphyllum* and *C. mandoni* have very slender tubules and clefts, which are short in young anthers. All the species have in common elongate calyx lobes and elongate tubules, so that to place them in different genera seems unwarranted.

As to origin, it has been shown that there is evidence for regarding *Ceratostema* as either a siphonandroid or a thibaudioid derivative. In either case, it must be concluded that a group of species has been considerably modified from the ancestral form. In view of the above

facts I am inclined to believe the genus more closely related to *Siphonandra* and its allies than to *Thibaudia*, but this conclusion can not be definitely established.

ENGLERODOXA

To the original species (*E. alata* Hoer.) two more are added in this treatment, both from the Ecuadorian Andes, where the genus seems to be endemic. It is characterized by a long angled corolla much swollen at the base, elongate corolla lobes, and long tubules dehiscing by oblique pores. Its alliance to the group of *Siphonandra* is apparent, but it can not be closely associated with any other genus.

GONOCALYX

Two species of the West Indies (*Thibaudia portoricensis* Urb. and *Vaccinium smilacifolium* Griseb.) have been placed in *Ceratostema* by Hoerold, but they must certainly be considered generically distinct. To these species may be added a third, *Gonocalyx pulcher* Planch. & Lind., which, although authentically published, has been consistently neglected. These three species form a group of generic value, agreeing with the preceding in having the filaments distinct but contrasting with it in having the corollas cylindric and the corolla lobes and anther sacs shorter.

PERICLESIA

The single species placed in this genus, which is here described as new, is quite distinct from all others of the group and is possibly less closely related to *Siphonandra* than to other genera of this relationship. It possesses siphonandroid stamens, but in calyx structure it is more suggestive of certain species of *Ceratostema*. Its membranous calyx lobes, reduced in number to four, are also suggestive of *Lysiclesia*, another previously undescribed genus near *Orthaea*.

SEMIRAMISIA

Semiramisia, with three species, has the largest and most beautiful corollas of any genus of the tribe. Its calyx is continuous with the pedicel and all its flower parts are much enlarged. To compare it with any other genus is difficult, but its source in a siphonandroid stock is certain.

OREANTHES

This monotypic genus is widely divergent from *Siphonandra*, which nevertheless is probably its closest living ally. It has devel-

oped elongate calyx lobes, broadly ovate corolla lobes, a reduction of stamens to five, and slightly oblique rather than terminal pores. In habit it is slender, with small elliptic leaves.

CAVENDISHIA AND ITS ALLIES

The remaining group of Thibaudieae consists of four genera that must have been isolated from the primitive thibaudioid stock for a long period, probably longer than any other group except *Lateropora* and *Notopora*. Also they have been long separated from one another, as brought out by the clear-cut generic characters and the lack of dubiously placed species. All the genera associated here have stamens of two lengths, usually quite distinctly so. In considering this character one of primitive importance perhaps too much emphasis is placed upon it, but this hypothesis is supported by secondary characters, such as the development of large bracts in *Cavendishia* and wide rigid tubules in the anthers of *Satyria*.

Within the group the genera are very distinct. Perhaps the most isolated is *Satyria*, in which the filaments are strictly connate, the anthers rigid and crowded, with narrow sacs and flaring tubules. To place this well-marked genus in the *Cavendishia* group is perhaps inadvisable; it may have been isolated from the thibaudioid strain even longer, and may have developed its dimorphic anthers independently. *Cavendishia*, the largest genus of the tribe, has flowers very similar to those of *Thibaudia*, especially in species in which the dimorphism is not pronounced. In a great majority of the species large bracts are present, surrounding the short young racemes, but the loss of these is not a mark of generic value and seems to have occurred here and there throughout the genus. The two remaining genera, *Orthaea* and *Lysiclesia*, have developed very short stamens, with unequal filaments and subequal anthers. The latter genus has, in place of the usual calyx lobes, three large membranous bracts. Possibly its phylogenetic history is too closely coupled with that of *Orthaea* in this treatment.

CAVENDISHIA

As above mentioned, this genus is superficially marked by the usual presence of large imbricate bracts, the development of which may be associable with the success of the genus. The stamens are frequently subequal, but invariably the filaments and anthers are compensatingly unequal. In shape of anther sacs and tubules the stamens are identical with those of most species of *Thibaudia*, a fact which led most of the earlier authors to describe the species under that genus, overlooking the dimorphic character. Possibly the

phylogenetic divergence of *Cavendishia* is more recent than I have indicated here.

ORTHAEA

This comparatively small genus has stamens much shorter than those of *Cavendishia*, with anthers subequal and filaments invariably unequal and practically free. The mode of dehiscence varies, terminal pores being present in some of the species. Large bracts are not present except in one or two species, in which they are distinctly cavendishoid, suggesting such a recent divergence as is here indicated.

LYSICLESIA

This genus of two species of apparently small range is here first described. The corollas and stamens are precisely like those of *Orthaea*, but a most unusual development of the calyx limb has taken place, the lobes being reduced in number to three and enlarged to membranous bractlike structures. Whether this development is more recent than the staminal structure, or whether it is ancient and the stamens have reached an orthaeoid condition independently, is an open question.

SATYRIA

Satyria is a very coherent genus of wide range. The filaments are always strictly connate, forming a tube on the margin of which the anthers are set at close intervals. The anthers are closely appressed to one another, the sacs leading into the tubules imperceptibly, the tubules themselves broader than the sacs and sometimes flaring. Although the filaments are necessarily equal, the anthers are alternately strictly unequal.

DESCRIPTIVE LIST, WITH KEYS

KEY TO AMERICAN GENERA

Anthers terminating in vestigial tubules, the tubules functionless, not exceeding 0.5 mm. in length, the anthers dehiscing by lateral clefts.

1. **LATEROPORA** (p. 333).

Anthers terminating in tubules, dehiscing by pores or clefts in the tubules.

Tubules opening by extrorse clefts----- 2. **NOTOPORA** (p. 334).

Tubules opening by introrse clefts or terminal pores.

Stamens approximately isomorphic, with filaments and anthers all the same length (slightly dimorphic in genera nos. 3, 15, and 16, alternately spurred in genus no. 12).

Tubules rigid, long, slender, about half as much in diameter as the anther sacs, opening by terminal or oblique pores (pores seldom more than one-tenth the length of tubules, except in some species of genus no. 3).

Stamens twice as many as calyx (10).

Calyx continuous with the pedicel.

Lobes of calyx elongate-triangular, more than 2 mm. long; filaments often densely tomentose with retrorse hairs.

3. **CERATOSTEMA** (p. 335).

Lobes of calyx broadly triangular or apiculate, not more than 1.5 mm. long; filaments glabrous or minutely puberulous.

Tubules 3 or 4 times as long as anther sacs; corolla ample, cylindric-campanulate, the lobes triangular, as broad as long.

4. **SEMIRAMISIA** (p. 348).

Tubules slightly longer than anther sacs; corolla cylindric or prismatic, the lobes lanceolate, twice as long as broad.

5. **ENGLERODOXA** (p. 350).

Calyx articulate with the pedicel.

Filaments distinct (sometimes slightly coherent at base).

Corolla swollen at base, deeply cleft, the lobes lanceolate, at least one-fifth the total length; anther sacs elongate, 5.5 to 16 mm. long-----

5. **ENGLERODOXA** (p. 350).

Corolla tubular-cylindric, shallowly cleft; anther sacs short, 2 to 4 mm. long-----

6. **GONOCALYX** (p. 352).

Filaments connate for nearly their entire length.

Calyx lobes 5, small, not more than 2 mm. long; tubules opening by strictly terminal pores--

7. **SIPHONANDRA** (p. 355).

Calyx lobes 4, large, 20 to 25 mm. long; tubules opening by oblique pores-----

8. **PERICLESIA** (p. 357).

Stamens the same number as calyx lobes (5).

9. **OREANTHES** (p. 358).

Tubules wide, not much narrower than anther sacs, opening by elongate pores or lateral clefts (openings usually one-third the length of tubules or more, slightly shorter in genus no. 15).

Anther sacs very granular; tubules elongate-conical, rigid.

Calyx winged, each wing continuing to the apex of a lobe; connective divided, sending a branch up each tubule dorsally to its summit-----

10. **MYCERINUS** (p. 359).

Calyx cylindric or angled or winged (in which case the wings are opposite the sinuses); connective terminating at base of tubules.

Connectives unspurred; tubules united or distinct and often laterally connate (sometimes distinct to their bases).

11. **MACLEANIA** (p. 360).

Connectives alternately 2-spurred (sometimes all spurred); tubules distinct to their bases-----

12. **PSAMMISIA** (p. 384).

Anther sacs smooth or slightly granular; tubules cylindric, flexible.

Leaves variously shaped, several-nerved; stipules lacking (sometimes present in genus no. 3).

Calyx lobes short-triangular; corolla narrowly cylindric; tubules less than twice as long as the sacs (rarely longer).

Corolla winged, the wings obvious, corresponding to the lobes, membranous, with a vein running parallel to the outer margin-----

13. **ANTHOPTERUS** (p. 406).

Corolla cylindric or slightly angled.

Calyx articulate with pedicel----

14. **THIBAUDIA** (p. 410).

Calyx continuous with pedicel.

Stamens all the same length; leaves large, variously shaped, usually cuneate at base.

14. **THIBAUDIA**, sect. *Agathothibaudia* (p. 410).

Stamens usually of two lengths (in some species apparently isomorphic); leaves small, subcordate or truncate at base_____ 15. **THEMISTOCLESIA** (p. 439).

Calyx lobes lanceolate-triangular; corolla ample; tubules 3 to 5 times as long as the sacs_____ 3. **CERATOSTEMA** (p. 335).

Leaves lanceolate, 1-nerved, about 10 times as long as broad; stipules present_____ 16. **RUSBYA** (p. 445).

Stamens obviously of two lengths, the filaments or anthers or both alternately unequal.

Filaments unequal, distinct, or coherent in lower portion only.

Anthers unequal (rarely subequal); stamens nearly as long as corolla (at least half as long); large bracts usually present (but completely lacking in some species)_____ 17. **CAVENDISHIA** (p. 446).

Anthers equal; stamens about one-third as long as corolla; bracts rarely large.

Calyx with 5 short triangular lobes_____ 18. **ORTHAEA** (p. 509).

Calyx with 3 lanceolate-ovate lobes, the lobes bractlike, 25 mm. long or more_____ 19. **LYSICLESIA** (p. 517).

Filaments equal, connate for their entire length.

20. **SATYRIA** (p. 519).

1. **LATEROPORA** A. C. Smith, gen. nov.

Calyx cum pedicello articulatus, tubo campanulato, limbo erecto-patente 5-lobato. Corolla late cylindrica 5-lobata. Stamina 10 quam corolla leviter breviora, filamentis distinctis sicut connectivis dense tomentosis, antheris robustis basi protrusis rimis latis lateralibus dehiscentibus, tubulis rudimentariis. Arbor parva (vel frutex epiphyticus?), laminis coriaceis alternis breviter petiolatis pinnatinerviis. Flores in racemis brevibus paucifloris subterminalibus dispositi.

Calyx articulate with pedicel, the tube campanulate, the limb coriaceous, erecto-patent, 5-lobed, the lobes triangular; corolla coriaceous, broadly cylindric, 5-lobed, the lobes triangular, acute, pubescent within; stamens 10, slightly shorter than corolla; filaments coriaceous-carnose, distinct, attached to the anther dorsally a little below the middle; connective continuous with filament, densely tomentose, as also the upper part of the filament; anthers stout, oblong, granular, strongly curved, the lower one-third protruding horizontally ventrally, the tubules vestigial, the sacs dehiscing by broad lateral clefts extending from the apex at least as far as the angle (two-thirds of the anther length), probably the entire length with age; disk shallowly cup-shaped; ovary 5-locular; style stout, filiform, the stigma truncate.

Small tree (or possibly epiphytic shrub); leaves alternate, short-petioled, pinnate-veined; flowers in short few-flowered subterminal racemes, pedicellate, the pedicels short, with 2 to 4 ovate bractlets near base.

DISTRIBUTION: Known from a single species from Chiriquí Volcano in western Panama.

This is a remarkable and unmistakable genus, clearly marked from all others of the family by its laterally dehiscing anthers.

1. *Lateropora ovata* A. C. Smith, sp. nov.

Arbor parva (vel frutex epiphyticus?) generis characteribus; laminis ovatis basi attenuatis apice subacutis vel subobtusis pinnatinerviis; floribus ut supra descriptis.

Small tree (or possibly epiphytic shrub); branches and branchlets subterete, glabrous, striate, the bark of the branches grayish, of the branchlets brown; petioles thick (2 mm. in diameter), glabrous, about 6 mm. long; leaf blades firm, coriaceous, ovate, 7 to 10 cm. long, 4 to 6 (rarely to 8.5) cm. broad, glabrous, attenuate at base, decurrent on the petiole, subacute or subobtuse at apex, entire and narrowly revolute at margins, pinnate-veined, the secondary veins arcuate-ascending, 3 to 5 to a side, often oriented near base, the midvein and secondary veins plane or slightly impressed above, prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces; racemes terminal, the rachis stout (2.5 mm. in diameter), short (12 to 16 mm. long), bracteate at base, the bracts 4 to 6, broadly ovate, 4 to 5 mm. long and broad; pedicels stout (about 2 mm. in diameter), about 10 mm. long, bracteolate near base (bractlets 2 to 4, oblong-ovate, subacute or obtuse, 5 mm. long, 3 mm. broad), articulate with calyx; calyx tube campanulate, about 4 mm. long and 4 mm. in diameter at anthesis; limb about 5 mm. long including lobes, glabrous without, faintly pilose within distally, the lobes erect, triangular, subacute, 3 mm. long, 5 mm. broad, the sinuses acute; corolla broadly cylindric-globose, about 8 mm. long, 7 to 8 mm. in diameter at middle, reduced at both ends, sparsely pubescent without at middle with scattered brown hairs about 0.6 mm. long, the lobes suberect, triangular, acute, 3 mm. long, 4.5 to 5 mm. broad at base, densely pubescent within with crowded white-tomentose hairs 0.5 to 0.7 mm. long; stamens 6 mm. long; filaments fleshy, pale yellow-pink, about 4 mm. long, 1.6 mm. broad across base, gradually reduced to 0.6 mm. at point of attachment, the basal one-third glabrous, the upper part densely tomentose (especially at the margins and dorsally, the ventral hairs fewer and shorter) with pale silky hairs up to 1 mm. long to which are often attached numerous minute brownish nodules (glands?) 0.05 mm. in diameter; connective resembling the filament, extending to about 1 mm. from the apex of the anther; anthers very granular, stout (about 2 mm. in diameter), 5 mm. long vertically, the base protruding horizontally about 2 mm.; tubules submembranous, vestigial on the summit of each anther sac, 0.3 to 0.5 mm. long; style about 7 mm. long.

Type in the U. S. National Herbarium, no. 677,631, collected in humid forest, at summit of Cerro de la Horqueta, Chiriquí, Panama, altitude 2,268 meters, March 18, 1911, by H. Pittier (no. 3234).

DISTRIBUTION: Known only from the type collection.

The collector's notes read: "A small tree, unless epiphytic; flowers greenish white." It is a unique and well-marked plant, as noted in the generic discussion.

EXPLANATION OF PLATE 1.—*Lateropora ovata*, from photograph of type sheet. About one-half natural size.

2. *NOTOPORA* Hook. f. Icon. Pl. 12: 53. pl. 1159. 1876

Calyx tube obscurely articulate with pedicel, campanulate or cylindric; limb erect, 5-lobed; corolla subcylindric, 5-lobed, the lobes triangular, subacute; stamens 10, equal, nearly as long as corolla; filaments membranous, elongate, adherent to corolla for about half its length, attached to the anther dorsally

at base of tubules; anther sacs granular; tubules slightly shorter than sacs, opening by wide extrorse clefts; style about as long as corolla.

Low, slender shrubs with coriaceous pinnate-veined petioled leaves; flowers axillary, solitary or in pairs, pedicelled, densely brown-tomentose on all exterior surfaces.

DISTRIBUTION: Known only from the following species, which is apparently endemic to Mount Roraima, British Guiana.

This monotypic genus is clearly set off from all other Thibaudieae. The dorsally cleft tubules are unique, and the densely ferruginous-tomentose calyces and corollas are not duplicated elsewhere in the family. It is probably an ancient genus, which has long been isolated in the mountainous region of the Brazil-Guiana border. According to the original description and illustration, the filaments are very short and attached high up on the corolla. However, dissection establishes the fact that they are unusually long, being firmly adherent to the corolla for nearly half its length.

1. *Notopora schomburgkii* Hook. f. Icon. Pl. 12:53. pl. 1159. 1876.

Low shrub; branchlets terete, slender, glabrous, cinereous; petioles subterete, rugose, glabrous, 6 to 8 mm. long; leaf blades thick-coriaceous, ovate, 5 to 7 cm. long, 2.5 to 3.5 cm. broad, acute at base, subacute or short-acuminate at apex, entire and slightly thickened at margins, glabrous and lustrous above, when young densely tomentose beneath with short brown hairs, becoming glabrous, pinnate-veined, the midvein slightly impressed above, raised beneath, the secondary veins 3 or 4 to a side, spreading, plane on both surfaces, the veinlets reticulate, plane; flowers solitary or in pairs, axillary, densely brown-tomentose on all exterior surfaces with hairs up to 1 mm. long; pedicels subterete, 2 to 5 mm. long, obscurely bibracteolate, obscurely articulate with calyx; calyx (including tube and limb) about 10 mm. long and 7 mm. in diameter at summit, the lobes triangular, subacute, about 1.5 mm. long; corolla 10 to 16 mm. long, about 6 mm. in diameter; filaments slender, dark castaneous, closely adherent to corolla and appearing fused with it, about 7 mm. long, attached to anthers dorsally at bases of tubules; anther sacs strongly granular, about 3 mm. long; tubules wide, short-cylindric, distinct, about 2 mm. long, opening by wide extrorse clefts about as long; style filiform.

TYPE LOCALITY: British Guiana (doubtless vicinity of Mount Roraima). Type collected by Schomburgk (no. 566 [867]).

DISTRIBUTION: Vicinity of Mount Roraima, British Guiana and northern Brazil.

BRITISH GUIANA: *Schomburgk* 566 (867; K, type), 867 (B). "Our House," Mount Roraima, *in Thurn* 109 (N).

BRAZIL.

AMAZONAS: Rio Cuquenam, near Mount Roraima, *Ule* 8669 (Go).

The title of the page on which the original description appears is "*Notopora Schomburgkiana*." However, the specific name "*schomburgkii*" is applied to the actual description and also to the illustration; and since the type specimen was actually collected by Schomburgk, this form of the name may be preferred.

3. *CERATOSTEMA* Juss. Gen. Pl. 163. 1789

Calyx tube continuous or articulate with pedicel, obconical or campanulate; limb suberect, 5 (rarely 6) lobed, the lobes elongate-triangular or triangular, usually distinctly veined; corolla subcylindric, ample, glabrous or pilose, 5 (rarely 6) lobed, the lobes triangular or elongate-triangular; stamens 10, equal or alternately slightly unequal, nearly as long as corolla or slightly

exserted; filaments distinct, equal or alternately slightly unequal, attached to the anther dorsally near its base, often retrorsely pilose; anthers submembranous, the sacs slightly granular or nearly smooth, the tubules 3 to 5 times longer than the sacs (sometimes twice as long), opening by terminal pores or narrow elongate introrse clefts; style filiform, as long as corolla or slightly exserted.

Compact usually epiphytic shrubs with small, coriaceous, alternate, obscurely nerved, petioled leaves; inflorescence axillary; flowers solitary or in fascicles of 2 or 3, pedicelled, the pedicels deciduously hibracteolate.

DISTRIBUTION: Andes from Colombia to Bolivia, usually at high elevations. Sixteen species are described in this treatment and in addition there are five names which I am unable to place.

As mentioned in the discussion of generic relationships, this group is of doubtful ancestry but is easily recognized by its large calyx lobes. *C. peruvianum* Gmel. is the type species.

KEY TO THE SPECIES

Calyx continuous with pedicel (Peru and Bolivia).

Filaments densely tomentose dorsally with retrorse hairs; tubules opening by terminal or oblique pores (by short clefts in no. 1).

Calyx lobes ovate-lanceolate, 7 to 10 mm. long.

Corolla about 2 cm. long; tubules about twice as long as anther sacs, opening by short clefts----- 1. *C. lobbil.*

Corolla 4 to 5 cm. long; tubules 3 or 4 times as long as anther sacs, opening by terminal pores----- 2. *C. coccineum.*

Calyx lobes ovate-deltoid, 3 to 6 mm. long.

Corolla up to 4 cm. long (rarely 2 to 2.5 cm. long); tubules 3 or 4 times as long as sacs.

Leaves 1.5 to 4 cm. long; base of anthers obtuse— 3. *C. grandiflorum.*

Leaves 3.5 to 5.5 cm. long; base of anthers produced into an acute tip----- 4. *C. hirsutum.*

Corolla 2 cm. long or less; tubules less than twice as long as sacs.

5. *C. harmsianum.*

Filaments pilose with spreading hairs; tubules opening by lateral clefts.

Corolla glabrous.

Pedicels longer than flowers (corolla about 10 mm. long).

6. *C. buxifolium.*

Pedicels shorter than flowers (corolla 18 to 30 mm. long).

Leaves usually shorter than pedicels (leaves 8 to 15 mm. long, rarely more)----- 7. *C. microphyllum.*

Leaves usually longer than pedicels (leaves about 15 to 25 mm. long).

8. *C. graebnerianum.*

Corolla pilose, the hairs usually dense, pale, about 0.2 mm. long.

Flowers slender; corolla 20 to 30 mm. long----- 9. *C. mandoni.*

Flowers ample; corolla 35 to 50 mm. long----- 10. *C. spectabile.*

Calyx articulate with pedicel (Colombia and Ecuador).

Flowers small (corolla about 10 mm. long, slightly longer than pedicels); leaves 12 to 15 mm. long----- 11. *C. coronarium.*

Flowers larger (corolla 15 to 30 mm. long, about 3 times as long as pedicels); leaves rarely less than 15 mm. long.

Leaves lanceolate, attenuate at base----- 12. *C. lanceolatum.*

Leaves oblong or ovate, truncate or subcordate at base.

Leaves 6 to 10 cm. long----- 13. *C. speciosum*.

Leaves up to 4 cm. long.

Corolla glabrous, 25 to 32 mm. long at maturity----- 14. *C. rigidum*.

Corolla pilose (hairs pale, about 0.3 mm. long), 15 to 25 mm. long at maturity.

Calyx lobes lanceolate, 6 to 9 mm. long----- 15. *C. pubiflorum*.

Calyx lobes ovate-deltoid, 2 to 3 mm. long----- 16. *C. parvifolium*.

1. *Ceratostema lobbii* A. C. Smith, sp. nov.

Frutex; ramulis decidue puberulis; laminis ovato-oblongis basi subcordatis apice obtusis utrinque decidue breviter pilosis obscure 5-ple-nerviis; floribus extus pilosis axillaribus solitariis vel in fasciculis parvis; calyce cum pedicello continuo campanulato vel obprismatico, limbo suberecto 5-lobato, lobis ovatis; corolla tenuiter carnosae cylindrica, lobis lanceolatis; staminibus aequalibus, filamentis distinctis extus retrorse pilosis, tubulis longis gracilibus quam loculis duplo longioribus.

Shrub; branchlets terete, brownish, deciduously puberulous with pale hairs up to 0.3 mm. long; stipules frequently present, aristate, 2 to 3 mm. long; petioles subterete, sparsely pilose, 1 to 2 mm. long; leaf blades ovate-oblong, 3.5 to 4.5 cm. long, 1.2 to 2 cm. broad, thin-coriaceous, subcordate at base, obtuse at apex, entire at margins, glabrous or deciduously short-pilose (hairs up to 0.5 mm. long) on both surfaces, obscurely 5-ple-nerved, the midnerve plane or slightly impressed above, raised beneath, the secondary nerves obscure above, slightly raised beneath, the veinlets obscurely reticulate; flowers axillary, solitary or in fascicles of 2 or 3, pilose on all external surfaces with pale spreading hairs up to 0.5 mm. long; pedicels slender, 5 to 12 mm. long, circumscribed at base by several lanceolate bractlets 2 to 3 mm. long, continuous with calyx; calyx tube campanulate or obprismatic, 2 mm. long and 3 mm. in diameter at anthesis; limb 9 to 10 mm. long including lobes, the lobes ovate, acute, several-veined, membranous, about 9 mm. long, 4 to 5 mm. broad; corolla thin-carnose, cylindric, 20 to 22 mm. long; about 5 mm. in diameter, the lobes lanceolate, sometimes spreading, 4 to 6 mm. long, 1.5 to 2 mm. across; stamens equal, about 21 mm. long; filaments about 2 mm. long, densely pubescent with stiff, matted, pale brown retrorse hairs about 0.5 mm. long, continued into slender connectives; anther sacs nearly smooth, narrowed at base, about 7 mm. long; tubules erect, slender, about 14 mm. long, opening by introrse oval clefts less than 1 mm. long; style about as long as corolla, the stigma truncate.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected in "Columbia" (probably in Peru) by W. Lobb (no. 252).

DISTRIBUTION: Doubtful; known only from the type collection.

Although the specimen here described is labeled "Columbia," it is so closely related to the following Peruvian species that I am certain it also is native in the Peruvian Andes. Many of Lobb's specimens bear this erroneous inscription. The present species and the four following form a very distinct group of *Ceratostema*, as mentioned in the discussion of generic relationships at the beginning of this paper, characterized by very slender tubules with small pores and by retrorsely tomentose filaments. From its allies, *C. lobbii* is distinguished by its long calyx lobes, short corollas, and comparatively short tubules opening by short clefts.

EXPLANATION OF PLATE 2.—*Ceratostema lobbii*, from photograph of type sheet. About one-half natural size.

2. *Ceratostema coccineum* Hoer. Bot. Jahrb. Engler 42: 317. 1909.

Shrub about 1 meter high, often epiphytic; branchlets subterete and glabrous when old, when young grooved and loosely pilose; petioles stout (1 mm. in diameter), about 2.5 mm. long, sparsely pilose or glabrescent; leaf blades thick-coriaceous, oblong or ovate-oblong, 3 to 4 cm. long, 1 to 1.5 cm. broad, rounded at base, obtuse or subacute at apex, entire, slightly thickened, and somewhat revolute at margins, glabrous or sparsely short-pilose on both surfaces, sometimes sparsely punctate, pinnate-veined, the midvein impressed above, prominent beneath, the secondary veins plane, obscure, 2 to 4 to a side, oriented near base; flowers axillary, solitary or in fascicles of 2 or 3; pedicels stout (about 1.3 mm. in diameter), 10 to 23 mm. long, rugose, pubescent with pale spreading hairs about 0.25 mm. long, circumscribed at base by several ovate ciliate-margined bractlets about 2 mm. long, continuous with calyx; calyx tube obconical, 4 to 7 mm. long, about 5 mm. in diameter at summit, pubescent as the pedicel; limb subcoriaceous, suberect, 8 to 12 mm. long, sparsely pilose, the lobes lanceolate-triangular, acute, 7 to 10 mm. long, 3 to 4 mm. across base; corolla carnose, glabrous, or sparsely pilose (hairs pale, about 0.2 mm. long), cylindric, subinflated, 40 to 50 mm. long when mature, about 8 mm. in diameter, the lobes triangular, acute, 3 to 5 mm. long and 4 mm. across base; stamens isomorphic, about 45 mm. long; filaments about 6 mm. long, 0.5 mm. wide, densely pubescent dorsally with fuscous straight appressed retrorse hairs about 0.4 mm. long, attached to the anther dorsally near its base; anther sacs nearly smooth, 8 to 11 mm. long, produced at base; tubules erect, slender (0.4 to 0.5 mm. in diameter), about 35 mm. long, flaring at apex and opening by apical pores, the pores 0.5 mm. in diameter, sometimes lacerated at margin; style slightly exserted, about 0.6 mm. in diameter.

TYPE LOCALITY: East of Palca, Department of Junín, Peru, altitude 3,400 to 3,600 meters. Type collected by Weberbauer (no. 2505).

DISTRIBUTION: Andes of central Peru, altitude 2,300 to 4,000 meters.

PERU.

HUÁNUCO: Huánuco, *Macbride & Featherstone* 2163 (F, N). Cani, *Macbride* 3544 (F). Tambo de Vaca, *Macbride* 4376 (F).

JUNÍN: East of Palca, *Weberbauer* 2505 (B, type).

This is a species with beautiful large flowers, distinguishable from the preceding on the characters mentioned in the key. Anthers of the type specimen do not show the tubules, which are described by Hoerold as "poro elongato vel rima parva dehiscentes." However, this is doubtful, since in all other characters the type agrees with other collections here cited.

3. *Ceratostema grandiflorum* R. & P. Fl. Peruv. Chil. 4: pl. 383. 1802.

Ceratostema longiflorum Lindl.; Lem. Fl. Serr. Jard. I. 4: 346b. pl. 353. 1848.

Ceratostema urbanianum Hoer. Bot. Jahrb. Engler 42: 319. 1909.

Low shrub; branchlets subterete, cinereous, glabrous or minutely puberulous; stipules sometimes present, aristate, about 3 mm. long; petioles subterete, deciduously pilose, 1 to 2 mm. long; leaf blades ovate or ovate-oblong, 1.5 to 3 cm. long, 0.7 to 1.2 cm. broad, rigidly coriaceous, subcordate or rounded at base, subacute or obtuse at apex, entire at margins, glabrous or deciduously short white-pilose, obscurely 3 to 5 nerved from base, the midnerve slightly impressed above, raised beneath, the secondary nerves obscure; flowers axillary, solitary or in fascicles of 2 or 3, frequently short-pilose (hairs about 0.3 mm. long) on all external surfaces, becoming glabrous; pedicels slender, 5 to 15 mm. long, circumscribed at base by several oblong pilose bracts about 2 mm. long, continuous with calyx; calyx tube broadly campanulate or obconical,

rugose, 2 to 3 mm. long, 4 to 5 mm. in diameter at anthesis; limb erecto-patent, 5 to 7 mm. long including lobes, the lobes 5 or 6, triangular-ovate, acute, 4 to 6 mm. long, 3 to 4 mm. broad; corolla thin-carnose, cylindric, 2 to 4 cm. long, about 6 mm. in diameter, 5 or 6 lobed, the lobes triangular, about 1.5 mm. long; stamens equal, 20 to 30 mm. long; filaments about 3 mm. long, densely pubescent with matted retrorse hairs about 0.5 mm. long, continued into slender connectives; anther sacs nearly smooth, 5 to 6 mm. long; tubules slender, erect, 12 to 25 mm. long, opening by apical or slightly oblique pores; style frequently exerted, the stigma truncate.

TYPE LOCALITY: Andes of central Peru. Type collected by Ruiz and Pavon (or by Dombey?).

DISTRIBUTION: Andes of central Peru, altitude 2,800 to 3,700 meters.

PERU: Huasa-Huasi, *Dombey* (B, type collection?). "*Jameson*" (K). "*Columbia*," *Lobb* 3 (K).

HUÁNUCO: Muña, *Pearce*, in May, 1863 (K). Mito, *Macbride* 3361 (F).

JUNÍN: Huacapistana, *Weberbauer* 2202 (B, type of *C. urbanianum*).

Among the above specimens there is some variation in the degree of floral pubescence, a character which in this case seems to be dependent upon maturity. The Lobb specimen is probably erroneously labeled, and the Jameson specimen, which must have come from Peru, may not have been his own collection.

4. *Ceratostema hirsutum* R. & P. Fl. Peruv. Chil. 4: pl. 383. 1802.

Ceratostema cordifolium Dun.; DC. Prodr. 7: 553. 1839.

Thibaudia hirsuta R. & P.; DC. Prodr. 7: 553. 1839, as synonym.

Slender shrub; branchlets terete, cinereous, glabrous; stipules usually present, about 3 mm. long; petioles rugose, 2 to 4 mm. long, nigrescent, glabrous; leaf blades oblong or ovate-oblong, 4 to 5.5 cm. long, 1.5 to 2.5 cm. broad, coriaceous, subcordate at base, acute at apex, entire and slightly revolute at margins, glabrous on both surfaces or sparsely brown-pilose beneath, obscurely 5 to 7 pli-nerved, the midnerve slightly impressed above, raised beneath, the secondary nerves oriented near base, ascending, plane or slightly raised beneath; flowers axillary, solitary or in pairs; pedicels 8 to 12 mm. long, slender, pilose with pale spreading hairs up to 0.2 mm. long, circumscribed at base by several oblong acute fimbriate bractlets 2 to 3 mm. long, continuous with calyx; calyx tube subrugose, campanulate or broadly obconical, 2 to 2.5 mm. long, 3 to 4 mm. in diameter at anthesis; limb suberect, pilose or glabrescent, 4 to 4.5 mm. long including lobes, the lobes ovate, short-acuminate, about 4 mm. long and 3 mm. broad; corolla thin-carnose, subcylindric, glabrous, up to 35 mm. long, 5 mm. in diameter; stamens equal, about 30 mm. long; filaments 2 to 3 mm. long, densely pubescent with matted retrorse hairs about 0.5 mm. long, continued into slender connectives; anther sacs nearly smooth, about 6 mm. long; tubules slender, erect, about four times longer than the sacs, opening by apical or slightly oblique pores; style as long as corolla, the stigma truncate.

TYPE LOCALITY: Near Muña, Department of Huánuco, Peru. Type collected by Ruiz and Pavon (?).

DISTRIBUTION: Known only from the type locality, altitude about 3,700 meters.

PERU.

HUÁNUCO: Muña, *Pearce*, in June, 1863 (K).

This species is very close to the last, but differs slightly in leaf shape, which character, combined with the acute anther sacs, seems of specific value.

5. *Ceratostema harmsianum* Hoer. Bot. Jahrb. Engler 42:317. 1909.

Low shrub; branchlets subterete, swollen at the bases of petioles, cinerous, essentially glabrous; stipules aristate, about 2 mm. long, deciduous; petioles rugose, glabrous, subnigrescent, 2 to 3 mm. long; leaf blades ovate-oblong, 12 to 17 mm. long, 6 to 8 mm. broad, rigidly coriaceous, rounded or broadly cuneate at base, obtuse or subacute at apex, entire or shallowly crenate at margins, glabrous, obscurely 3 to 5 pli-nerved, the midnerve slightly impressed above, raised beneath, the secondary nerves obscure; flowers axillary, solitary or in pairs, short-pilose on all external surfaces (hairs pale, spreading, about 0.3 mm. long); pedicels 6 to 8 mm. long, circumscribed at base by several imbricate oblong acute bractlets about 2 mm. long, continuous with calyx; calyx tube campanulate, 3 to 3.5 mm. long, about 4 mm. in diameter at anthesis; limb erecto-patent, 4 mm. long including lobes, the lobes ovate-deltoid, acute, about 3 mm. long and 2 mm. across; corolla thin-carnose, cylindric, 16 to 19 mm. long by 5 mm. in diameter, the lobes deltoid, about 2 mm. long; stamens equal, about 18 mm. long; filaments 3 mm. long, densely pubescent with matted retrorse hairs about 0.5 mm. long, continued into slender connectives; anther sacs smooth, about 8 mm. long; tubules slender, longer than the sacs, opening by apparently apical pores; style as long as corolla, the stigma truncate.

TYPE LOCALITY: Monson, Department of Huánuco, Peru, altitude 3,300 to 3,500 meters. Type collected by Weberbauer (no. 3374).

DISTRIBUTION: Known only from the type collection.

PERU.

HUÁNUCO: Monson, *Weberbauer* 3374 (B, type).

Although the corolla is unusually short and the tubules are less elongate than usual, there is no doubt that this plant is a true *Ceratostema*, related to the two preceding species.

6. *Ceratostema buxifolium* Field. & Gardn. Sert. Pl. 1: pl. 7. 1844.

Thibaudia microphylla Lindl. Gard. Chron. 1848:23. 1848.

Themistoclesia buxifolia Klotzsch, Linnaea 24:42. 1851.

Small compact shrub; branchlets straight, striate, cinereous, glabrous, slightly swollen at petioles; stipules sometimes present, up to 2 mm. long; petioles slender, subrugose, 1 to 2 mm. long; leaf blades elliptic, 8 to 15 mm. long, 5 to 8 mm. broad, rigidly coriaceous, rounded or cuneate at base, rounded at apex, entire at margins, essentially glabrous, obscurely pli-nerved, the midnerve slightly impressed above, the secondary nerves immersed; flowers axillary, usually solitary, essentially glabrous in all parts; pedicels nigrescent, slender, flexuose, 10 to 20 mm. long, bibracteolate near base (bractlets lanceolate, 2 to 3 mm. long), continuous with calyx; calyx tube broadly obconical, rugose, about 1 mm. long and 2 mm. in diameter; limb spreading, 3 mm. long including lobes, the lobes ovate, apiculate, about 1.5 mm. long and 4 mm. across; corolla thin-carnose, subcylindric, 10 to 11 mm. long, about 4 mm. in diameter near base, gradually contracted above, the lobes deltoid, about 1 mm. long; stamens equal, 9 to 10 mm. long; filaments subnigrescent, about 2 mm. long, distally pilose, especially at margins, with spreading or ascending hairs about 0.2 mm. long, continued into short slender connectives; anther sacs dark castaneous, slightly granular, about 3.5 mm. long; tubules flexible, 5.5 mm. long, opening by wide clefts nearly as long; style as long as corolla, the stigma truncate or subpeltate.

TYPE LOCALITY: Monte de San José, Peru. Type collected by Mathews (no. 1176).

DISTRIBUTION: Andes of Peru.

PERU: *Maclean* (K). "Columbia," *Lobb* 2 (K, probably type of *Thibaudia microphylla*).

JUNÍN: Huacapistana, 3,000 to 3,100 meters, *Weberbauer* 2075 (B).

This is a pretty little species, without much superficial resemblance to the typical members of the genus. The Lobb collection, which is doubtless from Peru, is probably the type of *Thibaudia microphylla*, which was "raised from seeds gathered in Peru by Mr. William Lobb."

7. *Ceratostema microphyllum* Hoer. Bot. Jahrb. Engler 42:316. 1909.

Shrub 1 to 2 meters high; branchlets subglabrous, subterete when old, channeled when young, swollen at base of petioles; petioles stout (1 mm. in diameter), about 1.5 mm. long, puberulous with very short scattered hairs or glabrescent; leaf blades ovate or oblong-ovate, 8 to 17 mm. long, 6 to 10 mm. broad, rounded at base, acute at apex, entire and slightly thickened at margins, glabrous when old, when young sparsely white-pilose and with a few short appressed stiff brown hairs, obscurely 3 to 5 pinnately-nerved, the midnerve slightly depressed above, prominent beneath; flowers numerous near ends of branchlets, solitary or in fascicles of 2 or 3; pedicels slender (about 0.6 mm. in diameter), 10 to 14 mm. long, subterete, glabrous or with a few scattered stiff brown hairs, circumscribed at base by numerous imbricate triangular ciliate-margined bractlets 2 to 3 mm. long, continuous with calyx; calyx tube obconical, 2.5 to 3 mm. long, about 2 mm. in diameter at summit, essentially glabrous; limb about 4 mm. long including lobes, the lobes triangular, acute, 2.5 to 3 mm. long, 2.5 mm. across base, sparsely pilose at margins; corolla essentially glabrous, cylindric, about 25 mm. long and 4 mm. in diameter, the lobes elongate-triangular, subacute, about 5 mm. long and 2 mm. across base; stamens slightly dimorphic (due to difference in filaments), about as long as corolla; filaments 3 mm. and 4 mm. long respectively, about 0.4 mm. broad at base, densely white-pilose on all surfaces with spreading hairs about 0.2 mm. long, attached to the anther dorsally near its base; anther sacs granular, about 4.5 mm. long; tubules slender, about 19 mm. long, opening by elongate distal clefts of indefinite length; style about as long as corolla, about 0.3 mm. in diameter.

TYPE LOCALITY: Yanamanche, Department of Cuzco, Peru, altitude 3,400 meters. Type collected by *Weberbauer* (no. 4974).

DISTRIBUTION: Andes of southern Peru, altitude 3,300 to 3,700 meters.

PERU.

Cuzco: Yanamanche, *Weberbauer* 4974 (B, type). Cosñipata, *Weberbauer* 6928 (B, F). Marcapata, *Weberbauer* 7790 (F).

8. *Ceratostema graebnerianum* Hoer. Bot. Jahrb. Engler 42:315. 1909.

Shrub; branchlets glabrous, shallowly grooved when young, subterete when old, fuscous, swollen at base of petiole; petioles subterete, glabrous, about 2 mm. long; leaf blades oblong or ovate-oblong, 18 to 26 mm. long, 8 to 12 mm. broad, rounded or subcuneate at base, obtuse or subacute at apex, shallowly crenate at margins, glabrous above, sparsely brown-pilose or glabrous beneath, pinnate-veined, the midvein slightly impressed above, prominent beneath, the secondary veins 2 or 3 to a side, ascending, plane, oriented from midvein near base, the veinlets reticulate, obscure; flowers in fascicles of 2 or 3; pedicels subterete, glabrous, 8 to 12 mm. long, circumscribed at base by a few minute ovate glabrous bractlets, continuous with calyx; calyx tube obconical, about 3 mm. long and 3 mm. in diameter at summit; limb about 5 mm. long including lobes, the lobes lanceolate-triangular, acute, about 3 mm. long, marked with a few black branching subparallel longitudinal veins not quite reaching the margins, the margins sometimes faintly soft-ciliate; corolla bright red, cylindric,

about 25 mm. long, 3 to 4 mm. in diameter, with a few scattered minute stiff brownish hairs, the lobes lanceolate, subacute, often reflexed, about 7 mm. long; stamens slightly shorter than corolla (alternately slightly dimorphic); filaments about 2.5 mm. and 3.5 mm. long, respectively, distally pubescent with pale substrigose hairs up to 0.3 mm. long, continued into a long slender nigrescent connective; anther sacs slightly granular, about 4 mm. long; tubules slender, about 19 mm. long, opening by short introrse clefts; style about as long as corolla, often exserted, the stigma truncate.

TYPE LOCALITY: Sandía, Department of Cuzco, Peru, altitude 3,100 to 3,300 meters. Type collected by Weberbauer (no. 742).

DISTRIBUTION: Eastern Cordillera of southern Peru and northern Bolivia, altitude 2,800 to 3,600 meters.

PERU: Gachapota, *Lechler* 2585 (K), 2693 (K).

Cuzco: Sandía, *Weberbauer* 742 (B, type). Lucumayo Valley, *Cook & Gilbert* 1310 (N). Cerro de Cusilluyoc, *Pennell* 14096 (F, N, Y).

BOLIVIA.

LA PAZ: Unduavi, *Buchtien* 31 (F, G, Y), 911 (F, N).

Compared with the last species this differs only by its larger leaves. There are more or less intermediate specimens, and the specific identity of the two may well be questioned. Compared with the following species *C. graebnerianum* differs only by having its corollas glabrous rather than pilose. One of the specimens cited under *C. mandoni* (*Bang* 1939) has corollas sometimes pilose and sometimes quite glabrous, indicating that this character is not very trustworthy. The three names here discussed are questionably retained; were they not already established I should prefer to consider them as applying to forms of a single variable species. A local name for *C. graebnerianum* is "pucapinchichu."

9. *Ceratostema mandoni* Britton, Bull. Torrey Club 20: 137. 1893.

Ceratostema pilgerianum Hoer. Bot. Jahrb. Engler 42: 318. 1909.

Ceratostema sanguineum Hoer. Bot. Jahrb. Engler 42: 318. 1909.

Shrub; branchlets subterete and glabrous when old, when young grooved and sparsely pilose, swollen at bases of petioles; stipules usually present; petioles subterete, stout (1 mm. in diameter), about 2 mm. long, glabrescent; leaf blades thick-coriaceous, oblong or ovate-oblong, 13 to 28 mm. long, 6 to 13 mm. broad, subcuneate or rounded at base, obtuse or subacute at apex, subentire and slightly thickened at margin, glabrous or sparsely pilose on both surfaces, pinnate-veined, the midvein slightly impressed above, prominent beneath, the secondary veins obscure, oriented near base; flowers axillary or in groups of 2 or 3; pedicels stout (about 1 mm. in diameter), 5 to 15 mm. long, densely pubescent (hairs pale, spreading, about 0.4 mm. long), circumscribed at base by a few oblong acute pilose bractlets about 1.5 mm. long, continuous with calyx; calyx tube obconical, 2 to 3 mm. long, about 2 mm. in diameter at summit, pubescent as the pedicel; limb suberect, 5 to 7 mm. long, pilose (hairs somewhat shorter and sparser than those of the tube), the lobes lanceolate, short-acuminate, 4 to 5 mm. long, about 2 mm. broad at base, with a few subparallel branching veins; corolla thin-carnose, densely pilose (hairs pale, spreading, about 0.25 mm. long), cylindric, subinflated. 20 to 30 mm. long when mature, 6 to 8 mm. in diameter, the lobes elongate-triangular, short-acuminate, 4 to 5 mm. long, 2 mm. across base; stamens 18 to 27 mm. long, approximately equal in length, the alternate filaments and anthers compensatingly unequal; filaments about 3 mm. and 3.5 mm. long, respectively, densely pilose distally on all surfaces (hairs spreading, pale brown, about 0.3 mm. long), attached to the anther dorsally

near its base; anther sacs nearly smooth, 5 to 6 mm. long; tubules slender, 13 to 20 mm. long, opening by elongate clefts; style about as long as corolla.

TYPE LOCALITY: Mapiri, Department of La Paz, Bolivia, altitude about 3,100 meters. Type collected by Rusby (no. 2632).

DISTRIBUTION: Eastern Cordillera of southern Peru and northern Bolivia, altitude 2,700 to 3,600 meters.

PERU.

Cuzco: Sandía, *Weberbauer* 742a (B, type of *C. pilgerianum*). Between

Sandía and Myomyo, *Weberbauer* 889 (B, type of *C. sanguineum*).

Cedrobamba, *Heller* 2186 (N). Valle de Santa Ana, *Bues* 2114 (N, Y).

BOLIVIA: *Bang* 1939 (F, G, N, Y). Pelichuco, *Pearce*, in December, 1864 (K).

Tacacoma, *Mandon* 548 (G, N). Tablas, *Herzog* 2147 (B).

LA PAZ: Mapiri, *Rusby* 2632 (Y, type). Cocopunco, *Tate* 312 (Y), 370 (Y).

The taxonomic standing of this species is discussed in connection with *C. graebnerianum*. In the original publication the type is erroneously cited as a *Bang* collection. The type of *C. pilgerianum* in the original publication is cited as *Weberbauer* 472a. I am unable to find any consequential differences among the three types here involved.

10. *Ceratostema spectabile* Rusby, Bull. N. Y. Bot. Gard. 4: 404. 1907.

Shrub; branchlets subterete, cinereous, soft-pilose with short spreading hairs when young, becoming glabrous, swollen at bases of petioles; petioles pilose as the branchlets, subterete, 2 to 3 mm. long; leaf blades oblong-ovate, 20 to 30 mm. long, 6 to 12 mm. broad, cuneate at base, obtuse at apex, entire and plane at margins, sparsely white-pilose on both surfaces (hairs about 0.4 mm. long), becoming glabrous, pinnate-veined, the midvein slightly impressed above, prominent beneath, the secondary veins 2 or 3 to a side, ascending, oriented from midvein near base, plane, obscure, the veinlets reticulate, obscure; flowers axillary, solitary or in fascicles of 2 or 3; pedicels terete, 6 to 10 mm. long, densely pubescent with pale spreading hairs about 0.4 mm. long, circumscribed at base by a few lanceolate pubescent bractlets up to 7 mm. in length, bibracteolate near middle, continuous with calyx; calyx tube obconical, about 5 mm. long and 4.5 mm. in diameter at summit, pubescent as the pedicel, the limb erect, about 6 mm. long including lobes, the lobes lanceolate-ovate, subacute, about 5 mm. long and 2.5 mm. across base; corolla bright red, densely pilose (hairs spreading, about 0.3 mm. long), cylindric, 35 to 50 mm. long, 7 to 10 mm. in diameter, longitudinally veined, the lobes triangular, subacute, about 3 mm. long; stamens nearly as long as corolla, the alternate filaments and anthers compensatingly unequal; filaments about 3 mm. and 4 mm. long, respectively, densely pilose distally (hairs pale, spreading, about 0.3 mm. long), continued into a long slender connective; anther sacs slightly granular, about 5 mm. long; tubules slender, about 27 mm. and 26 mm. long, respectively, opening by elongate distal clefts of indefinite length; style about as long as corolla, the stigma truncate.

TYPE LOCALITY: Bolivia (probably Department of La Paz). Type collected by *Bang* (no. 2605).

DISTRIBUTION: Andes of Peru and Bolivia, altitude 3,000 to 3,600 meters.

PERU.

JUNÍN: Province Jauja, *Weberbauer* 6644 (B, F, N).

Cuzco: Lucumayo, *Pearce* (K).

BOLIVIA: *Bang* 2605 (F, G, N, Y, type).

LA PAZ: Unduavi, *Buchtien* 2979 (N, Y).

This is a species quite distinct from the preceding on the basis of its more robust habit, larger leaves, and larger flowers.

EXPLANATION OF PLATE 3.—*Ceratostema spectabile*, from photograph of type sheet. About one-half natural size.

11. *Ceratostema coronarium* Linden; Hook. f. Bot. Mag. Curtis 92: pl. 5575. 1866, as synonym.

Thibaudia coronaria Hook. f. Bot. Mag. Curtis 92: pl. 5575. 1866.

Themistoclesia coronilla Lind. & André, Illustr. Hort. 17: 176. pl. 33. 1870.

Low compact shrub; branchlets subterete or angled, stramineous, swollen at bases of petioles, when young laxly pilose, hairs about 0.4 mm. long; stipules lacking or early deciduous; petioles subterete, stramineous, essentially glabrous, 1 to 2 mm. long; leaf blades ovate, rigidly coriaceous, 11 to 15 mm. long, 6 to 8 mm. broad, rounded or broadly cuneate at base, rounded or obtuse at apex, entire at margins, glabrous on both surfaces or minutely brown-pilose beneath, obscurely 3-nerved from base, the midnerve slightly impressed above, raised beneath, the secondary nerves immersed; flowers axillary, solitary or in pairs; pedicels rugose, 7 to 10 mm. long, laxly pilose with pale hairs up to 0.5 mm. long, bibracteolate near base (bractlets lanceolate, about 1 mm. long, fimbriate), circumscribed at base by several imbricate ovate bracts up to 2 mm. long, obscurely articulate with calyx; calyx tube prismatic, strongly rugose, pilose as the pedicel, 2 to 2.5 mm. long, 2 to 3 mm. in diameter at anthesis; limb erecto-patent, submembranous, 2.5 mm. long including lobes, the lobes ovate-deltoid, about 2 mm. long, sometimes glandular-margined; corolla submembranous, essentially glabrous, subcylindric, 10 to 11 mm. long, 4 to 5 mm. in diameter, the lobes deltoid, about 1.5 mm. long; stamens, subequal, as long as corolla; filaments 2 mm. long, sparsely pilose at distal margins; anther sacs slightly granular, 3.5 mm. long; tubules flexible, about 6 mm. long, opening by elongate clefts; style filiform, about as long as corolla, the stigma truncate or subpeltate.

TYPE LOCALITY: Near Pamplona, Department of Norte de Santander, Colombia. Type a cultivated plant, introduced by Linden.

DISTRIBUTION: Known only from the type locality.

COLOMBIA.

NORTE DE SANTANDER: Near Pamplona, *Linden* (K, type). Páramo del Hatigo, between Pamplona and Toledo, 2,900 meters, *Killip & Smith* 20663 (N, Y).

This species and the five following form a distinct group within the genus, separated from the more southern members by having the calyx articulate with the pedicel. The present species is quite distinct in the small size of all its parts.

12. *Ceratostema lanceolatum* Benth. Pl. Hartw. 142. 1844.

Low shrub; branchlets subterete, cinereous, soft-pilose with pale spreading hairs; stipules often present, aristate, 6 to 8 mm. long; petioles subterete, pilose, 2 to 4 mm. long; leaf blades lanceolate-oblong, 5 to 7 cm. long, 1 to 2 cm. broad, coriaceous, attenuate at base, acute at apex, entire and revolute at margins, scabridulous, pilose on both surfaces with pale spreading hairs about 0.5 mm. long, becoming glabrous above, pinnate-veined, the midvein impressed above, prominent beneath, the secondary veins 2 or 3 to a side, ascending, plane or obscure; flowers axillary, apparently solitary; pedicels rugose, stout, about 15 mm. long, laxly pilose (hairs pale, about 0.8 mm. long), circumscribed at base by several ovate bracts 2 to 4 mm. long, bibracteolate near base (bractlets lanceolate, 5 to 6 mm. long, pilose), obscurely articulate with calyx; calyx tube

obprismatic, carnose, winged to sinuses, 3 to 4 mm. long and about 5 mm. in diameter at anthesis, pilose as the pedicel; limb suberect, about 15 mm. long including lobes, subcoriaceous, the lobes lanceolate, about 13 mm. long and 5 mm. across base, sparsely pilose; corolla and stamens not seen in the type specimen but described as "sesquipollicaris, lobis lanceolatis acutis. Antherae vix corolla breviores"; style about 45 mm. long, the stigma truncate.

TYPE LOCALITY: Loja, Province of Loja, Ecuador. Type collected by Hartweg (no. 788).

DISTRIBUTION: Known only from the type collection.

ECUADOR.

LOJA: Loja, *Hartweg* 788 (K, type).

Although I have not seen a corolla of this species, it appears to belong in this section of the genus. From its allies it is easily distinguished by the leaf shape.

13. *Ceratostema speciosum* André, *Illustr. Hort.* 17:52. *pl.* 9. 1870.

Erect shrub; branchlets subterete, sparsely pubescent; petioles subterete, swollen, sparsely pubescent, 5 to 10 mm. long; leaf blades oblong or ovate-oblong, 6 to 10 cm. long, 2 to 3 cm. broad, cordate or subcordate at base, acute at apex, entire and narrowly revolute at margins, glabrous above, sparsely pubescent beneath, pinnate-veined, the secondary veins 3 or 4 to a side; inflorescence axillary, fasciculate, usually 3-flowered; pedicels terete, robust, curved, 12 to 20 mm. long, swollen distally and articulate with calyx; calyx tube obprismatic, short-pilose, 5-angled; limb suberect, about as long as tube, the lobes ovate-triangular; corolla carnose, subcylindric or narrowly 5-angled, 6 times longer than the calyx, glabrous; stamens slightly shorter than corolla, apparently equal; filaments glabrous; anther sacs granular; tubules slender, apparently about twice as long as sacs, opening by clefts; style about as long as corolla, the stigma truncate.

TYPE LOCALITY: Loja, Province of Loja, Ecuador. Type collected by Wallis.

DISTRIBUTION: Known only from the type collection.

I have not seen a specimen of this species, the above notes having been drawn up from the original description and the plate. The large leaves seem to distinguish it from related species.

14. *Ceratostema rigidum* Benth. *Pl. Hartw.* 220. 1846.

Shrub; branchlets subterete, brownish, slightly rugose; petioles stout (about 2 mm. in diameter), 3 to 4 mm. long, glabrous; leaf blades oblong or ovate-oblong, 3 to 4 cm. long, 1.5 cm. broad, cordate at base, rounded at apex, entire, thickened and slightly revolute at margins, glabrous above, sparsely pilose beneath (hairs scattered, appressed, brownish, about 0.5 mm. long), 5-nerved, the secondary nerves oriented from base or slightly above, with the mid-nerve slightly impressed above, somewhat prominent beneath, the veinlets obscure; inflorescence axillary toward ends of branchlets, 3 or 4 flowered; rachis about 5 mm. long, rugose; pedicels glabrous, striate, about 6 mm. long, deciduously bibracteolate near base, articulate with calyx; calyx tube obprismatic, rugose, short-pilose at base (hairs stout, about 0.3 mm. long); 3 mm. long and 3 mm. in diameter at summit at anthesis; limb about 13 mm. long including lobes, the lobes lanceolate, ovate, subacute, about 12 mm. long and 5 mm. across base, with several longitudinal freely branching veins not quite reaching the margins, the margins ciliate with stout brown hairs about 0.5 mm. long; corolla cylindric, about 32 mm. long, 7 to 11 mm. in diameter, essentially glabrous, viscid, the lobes triangular, subacute, about 2.5 mm. long; stamens slightly shorter than corolla, alternately slightly unequal; filaments connate at base, about 3.5 mm. and 4.5 mm. long, respectively, marginally pilose (hairs copious, about 0.3 mm. long), ventrally subpuberulous,

attached to the anther dorsally near its base; anther sacs slightly granular, about 5 mm. long; tubules wide, about 20 mm. and 19 mm. long, respectively, opening by short distal oblique clefts; style about as long as corolla, the stigma truncate.

TYPE LOCALITY: Laguna de Guanacas, Department of El Cauca, Colombia. Type collected by Hartweg (no. 1208*).

DISTRIBUTION: Central Cordillera of southern Colombia, altitude 3,300 to 3,700 meters.

COLOMBIA: *Lehmann* K172 (K).

EL CAUCA: Páramo de Santo Domingo, *Stuebel* 271a (B). Mount Pan de Azúcar, *Pennell* 7023 (Y).

This is a beautiful species with compact leaves and glossy viscous corollas.

15. *Ceratostema pubiflorum* Wedd. *Chlor. And.* 2: 181. 1855.

Shrub; branchlets subterete, fuscous, slightly puberulous, becoming glabrous; petioles glabrous, stout, about 1.3 mm. in diameter, 2 mm. long; leaf blades oblong or ovate-oblong, 13 to 18 mm. long, 10 to 13 mm. broad, cordate at base, rounded or obtuse at apex, entire and thickened at margins, glabrous above, essentially glabrous beneath, lustrous, obscurely 5-nerved, the secondary nerves oriented slightly above base, with the midnerve plane above, slightly prominent beneath, the veinlets obscure; flowers axillary, solitary (?); pedicels subterete, 3 to 4 mm. long, puberulous or glabrous, deciduously bibracteolate at middle, articulate with calyx; calyx tube subcylindric, glabrous, about 4 mm. long and 4 mm. in diameter; limb erect, about 9 mm. long including lobes, the lobes oblong-lanceolate, subacute, 8 to 9 mm. long, about 3 mm. broad, ciliate with minute stiff reddish-brown hairs up to 0.4 mm. long, the sinuses acute; corolla campanulate-cylindric, densely white-pilose (hairs about 0.2 mm. long), up to 24 mm. long, about 5 mm. in diameter, slightly contracted at throat, the lobes triangular, acute, less than 1 mm. long; stamens slightly shorter than corolla, alternately slightly unequal; filaments firmly connate in a ring, pubescent distally with stiff white hairs up to 0.4 mm. long, 3 mm. and 4 mm. long, respectively, attached to the anther dorsally near its base; anther sacs slightly granular, about 3.5 mm. long; tubules semiflexible, about 16 mm. and 17 mm. long, respectively, opening by distal introrse clefts 3 to 5 mm. long; style about as long as corolla, the stigma truncate.

TYPE LOCALITY: Province of Mariquita, Department of Tolima, Colombia, altitude 3,890 meters. Type collected by Linden (no. 918).

DISTRIBUTION: Central Cordillera of Colombia, altitude 3,500 to 3,900 meters.

COLOMBIA.

TOLIMA: Province of Mariquita, *Linden* 918 (K, type coll.).

CALDAS: Below Páramo del Quindío, *Pennell & Hazen* 10076 (N, Y).

From the following this species is distinguished by its exceptionally elongate calyx lobes.

16. *Ceratostema parvifolium* Benth. *Pl. Hartw.* 220. 1846.

Shrub; branchlets subterete, pubescent with pale spreading hairs about 0.5 mm. long when young, becoming glabrous; petioles subterete, rugose, about 1.2 mm. in diameter, about 2 mm. long, puberulous or glabrescent; leaf blades oblong or ovate-oblong, 20 to 35 mm. long, 9 to 15 mm. broad, cordate at base, rounded or obtuse at apex, entire and slightly revolute at margins, soft-pilose or glabrous above, pilose beneath (hairs pale, spreading, about 0.5 mm. long), becoming glabrous, obscurely 5-nerved, the midnerve slightly impressed above, prominent beneath, the secondary nerves oriented near base, plane, obscure; inflorescence axillary, subfasciculate, 2 to 5 flowered, circumscribed

at base by several deciduous oblong membranous bracts up to 5 mm. long; pedicels subterete, striate, 5 to 8 mm. long, densely and uniformly pilose (hairs pale, spreading, about 0.8 mm. long), deciduously bibracteolate near base (bractlets about 3 mm. long), articulate with calyx; calyx tube obprismatic, 3 to 4 mm. long, 3 to 4 mm. in diameter, pilose as the pedicel; limb 3 mm. long including lobes, the lobes triangular, acute, about 2 mm. long, pilose, especially at margins; corolla cylindric, about 15 mm. long and 6 mm. in diameter, pilose (hairs about 0.4 mm. long), the lobes triangular, acute, 2 mm. long; stamens slightly dimorphic, slightly shorter than corolla; filaments subconnate at base, about 1.5 mm. and 2.5 mm. long, respectively, pilose distally with white hairs up to 0.5 mm. long; anther sacs slightly granular, 2.5 to 3 mm. long; tubules about 7 mm. long, opening by distal introrse clefts 2 to 3 mm. long; style as long as corolla, the stigma truncate; fruit black, becoming glabrous, subspherical, up to 12 mm. in diameter, the calyx limb persistent.

TYPE LOCALITY: Laguna de Guanacas, Department of El Cauca, Colombia, altitude about 3,650 meters. Type collected by Hartweg (no. 1208).

DISTRIBUTION: Andes of Colombia.

COLOMBIA.

CUNDINAMARCA: Eastern páramos of Guasca, toward Gachetá, *Ariste Joseph B.* 112 (N).

I have not seen the type of this species, but the above cited specimen agrees well with the description.

DOUBTFUL SPECIES

CERATOSTEMA ANDREANUM Drake, Journ. de Bot. 3: 75. 1889.

TYPE LOCALITY: Huacapampa, northern Peru. Type collected by Poortmann (no. 222).

The type of this species is not available to me, but from the description, which emphasizes the lack of large calyx lobes, I conclude that it is not a species of *Ceratostema*. Possibly it is to be sought in *Cavendishia*. If so, it is a species not known to me.

CERATOSTEMA CHILLACOCHESE Danguy & Cherm. Bull. Mus. Hist. Nat. 28: 435. 1922.

TYPE LOCALITY: Chillacocha, Ecuador, altitude 3,500 meters. Type collected by Rivet (no. 772).

By the authors this species is compared with *C. harmsianum*, but inasmuch as the plant is from Ecuador and the description indicates an articulate calyx I am inclined to believe it related to the last five species listed in my key. I have not seen material referable to it.

CERATOSTEMA EMARGINATUM R. & P. Fl. Peruv. Chil. 4: pl. 384. 1802.

Thibaudia emarginata Dun.; DC. Prodr. 7: 561. 1839.

The plant pictured and described in the above references is certainly not a species of *Ceratostema*, and I am inclined to think it belongs in the tribe Vaccinieae, rather than Thibaudieae.

CERATOSTEMA OBLONGIFOLIUM Dun.; DC. Prodr. 7: 553. 1839.

TYPE LOCALITY: Peruvian Andes. Type not cited.

The description of this species, of which I have not seen the type, is too incomplete to permit speculation concerning its position.

CERATOSTEMA PERUVIANUM Gmel. Syst. Nat. 2: 676. 1791.

TYPE LOCALITY: Peru. Type collected by Joseph Jussieu.

Unfortunately I have not been able to see the type or a photograph of this species, which is the type of the genus and the earliest described plant of the

tribe Thibaudieae. The description applies equally well to any of the Peruvian species mentioned above, and possibly one of those names will eventually have to be supplanted by this.

4. SEMIRAMISIA Klotzsch, Linnaea 24:25. 1851

Calyx tube continuous with pedicel, obconical or narrowly angled to sinuses; limb suberect, the lobes 5, apiculate; corolla broadly campanulate, large, the lobes 5, triangular, acute; stamens 10, slightly shorter than corolla; filaments membranous, connate or distinct, attached to the anther dorsally near its base; anthers elongate, the sacs strongly granular, the tubules much longer than the sacs, opening by short introrse clefts; style filiform, nearly as long as corolla.

Slender shrubs, usually epiphytic, with small ovate leaves; leaves coriaceous, alternate, petioled, pli-nerved; flowers solitary or in pairs, axillary; pedicels stout, deciduously bracteolate below middle.

DISTRIBUTION: Andes from Venezuela to Peru. Three species are known, all of which seem comparatively rare and fairly local in distribution.

The beautiful large flowers, the continuous calyces, and the long slender tubules differentiate this genus from its allies. The genotype is *S. speciosa* (Benth.) Klotzsch.

KEY TO THE SPECIES

Filaments distinct; corolla 6 to 10 mm. in diameter (Venezuela).

1. *S. karsteniana*.

Filaments connate below middle; corolla usually more than 10 mm. in diameter (Ecuador and Peru).

Leaves ovate, 4 to 5 cm. broad, subcordate or truncate at base; calyx tube obprismatic, narrowly winged or angled..... 2. *S. speciosa*.

Leaves oblong-ovate, 2 to 4 cm. broad, cuneate at base; calyx tube obconical.
3. *S. weberbaueri*.

1. *Semiramisia karsteniana* Klotzsch, Linnaea 24:26. 1851.

Ceratostema karstenianum Hoer. Bot. Jahrb. Engler 42:276. 1909.

Low slender shrub, probably epiphytic; branchlets subterete, cinereous or brownish, slender, glabrous; petioles terete, subrugose, about 2 mm. long, glabrous; leaf blades ovate or ovate-oblong, 6 to 9 cm. long, about 3.5 cm. broad, rounded at base, acuminate at apex, entire or slightly crenulate at margins, glabrous above, deciduously short-brown-pilose beneath, 5-pi-nerved, the secondary nerves oriented near base, ascending, with the midnerve slightly impressed above, raised beneath, the veinlets reticulate, slightly raised on both surfaces; flowers axillary, solitary (?); pedicels glabrous, subrugose, slender, about 20 mm. long, bibracteolate above middle with lanceolate bractlets about 2 mm. long, continuous with calyx; calyx tube obprismatic, carnose-angled to sinuses, 4 to 6 mm. long, 4 to 5 mm. in diameter at summit at anthesis, deciduously puberulous; limb subspreading, 2 to 3 mm. long including lobes, the lobes broadly ovate, about 1 mm. long and 5 mm. broad; corolla broadly cylindric, membranous, glabrous or faintly puberulous, 35 to 45 mm. long, 6 to 10 mm. in diameter, slightly swollen at base, the lobes deltoid, 3 to 4 mm. long and broad; stamens equal, nearly as long as corolla; filaments distinct, about 4 mm. long and 1.5 mm. broad, distally pilose with pale spreading hairs about 0.2 mm. long, attached to the anther by short slender connectives; anther sacs incurved at base, 6 mm. long; tubules membranous, slender, about 30 mm. long, opening by oblique pores less than 1 mm. long; style about as long as corolla, the stigma truncate.

TYPE LOCALITY: Puerto Cabello, State of Carabobo, Venezuela. Type collected by Karsten (no. 169).

DISTRIBUTION: Known only from the type collection.

VENEZUELA.

CARABOBO: Puerto Cabello, *Karsten* 169 (B, type).

From the two remaining species of *Semiramisia* the present species is distinguished by its more slender flowers and distinct filaments.

2. *Semiramisia speciosa* (Benth.) Klotzsch, *Linnaea* 24:25. 1851.

Thibaudia speciosa Benth. Pl. Hartw. 141. 1844.

Slender shrub, probably epiphytic; branchlets subterete, slender, flexuose, cinereous or brownish, glabrous; petioles subrugose, 2 to 4 mm. long, glabrous; leaf blades broadly ovate, 7 to 9 cm. long, 3 to 5 cm. broad, rounded or lightly subcordate at base, acuminate at apex, entire at margins, glabrous, 5 to 7 pli-nerved, the secondary nerves oriented near base, arcuate-ascending, with the midnerve plane above, slightly raised beneath, the veinlets copiously reticulate; flowers axillary, apparently solitary; pedicels striate, glabrous, 25 to 30 mm. long, deciduously bracteolate, continuous with calyx; calyx tube obprismatic, 5-angled or 5-winged to sinuses (wings carnose, up to 1 mm. broad), about 6 mm. long, 5 to 8 mm. in diameter at summit at anthesis, glabrous; limb subspreading, submembranous, reticulate-veined, 3 to 5 mm. long including lobes, the lobes broadly triangular, 1 to 2 mm. long, 6 to 8 mm. broad; corolla campanulate-cylindric, thin-carnose or submembranous, longitudinally veined, glabrous, 35 to 45 mm. long, 12 to 18 mm. in diameter, the lobes deltoid, 4 to 6 mm. long and broad; stamens nearly as long as corolla, equal; filaments connate in a short tube, glabrous, about 2 mm. long; anther sacs incurved at base, 8 to 9 mm. long; tubules membranous, slender, 25 to 30 mm. long, the tips not observed; style about as long as corolla, the stigma truncate.

TYPE LOCALITY: Mountains of Loja, Province of Loja, Ecuador. Type collected by Hartweg (no. 785).

DISTRIBUTION: Known only from the type collection.

ECUADOR.

LOJA: Loja, *Hartweg* 785 (B, K, type, Y).

This species and the following are not sharply distinguished from one another, although the differences in leaf shape and in form of calyx tube are sufficient to permit their identification.

EXPLANATION OF PLATE 4.—*Semiramisia speciosa*, from photograph of type sheet. About one-half natural size.

3. *Semiramisia weberbaueri* Hoer. Bot. Jahrb. Engler 42:310. 1909.

Low slender shrub, probably epiphytic; branchlets terete, slender, glabrous, cinereous; petioles terete, 4 to 5 mm. long, glabrous; leaf blades ovate-oblong, 6 to 8 cm. long, 2 to 3.5 cm. broad, rounded to a truncate base, caudate-acuminate at apex, entire or slightly crenulate at margins, glabrous, 3 to 5 nerved, the secondary nerves spreading from base, with the midnerve plane above, slightly elevated beneath, the veinlets copiously reticulate, slightly raised above, plane beneath; inflorescence axillary at ends of branchlets, 2-flowered (always?); pedicels glabrous, striate, about 3 cm. long, 0.6 mm. in diameter at base, gradually increasing to 2 mm. in diameter at apex, deciduously bibracteolate below middle (bractlets triangular, appressed, about 1 mm. long), continuous with calyx; calyx tube obconical, 8 to 9 mm. long, about 8

mm. in diameter at summit, glabrous; limb erect, about 3 mm. long including lobes, the lobes less than 1 mm. long, 5 to 7 mm. across; corolla broadly campanulate-cylindric, about 40 mm. long and 15 mm. in diameter, thin, orange-red, copiously longitudinally veined, glabrous, the lobes 4 mm. long, 8 to 9 mm. across; stamens equal, 28 to 30 mm. long; filaments membranous, connate in a tube, about 6 mm. long, glabrous, attached to the anther dorsally by a broad connective; anther sacs about 6 mm. long, incurved at base; tubules membranous, rigid, erect, about 0.5 mm. in diameter, 20 mm. or more in length; stigma truncate.

TYPE LOCALITY: East of Chachapoyas, Department of Amazonas, Peru, altitude 2,200 meters. Type collected by Weberbauer (no. 4455).

DISTRIBUTION: Mountains of Ecuador and Peru, altitude 1,200 to 2,200 meters. ECUADOR: *André* (K). Río de Uavuncunacu, *André* 4567 (K). Tambo de Savanilla, *André* (K), 4561 (K).

PERU.

AMAZONAS: East of Chachapoyas, *Weberbauer* 4455 (B, type).

SAN MARTÍN: Cerro de Escalero, *Ule* 52p (B).

JUNÍN: Pichis Trail, Dos de Mayo, *Killip & Smith* 25850 (N, Y).

5. ENGLERODOXA Hoer. Bot. Jahrb. Engler 42: 310. 1909

Calyx tube articulate with pedicel (continuous in *E. loranthiflora*), prismatic or obconical; limb spreading or suberect, 5-lobed, the lobes triangular, acute; corolla subcylindric or 5-angled, large, broadly apophysate at base, 5-lobed, the lobes lanceolate-triangular; stamens 10, equal, nearly as long as corolla; filaments stout, distinct, attached to the anther dorsally near its base; anthers elongate, the sacs strongly granular, the tubules slender, much longer than the sacs, opening by short subterminal pores; style filiform, about as long as corolla.

Small compact shrubs with small coriaceous alternate pinnate-veined or pinnerved petioled leaves; inflorescence axillary, short-racemose; flowers pedicelled, several to an inflorescence; pedicels rugose, deciduously bibracteolate.

DISTRIBUTION: Andes of Ecuador. Three species are known, all apparently of limited range.

As noted in the discussion of generic relationships, the genus is characterized by its long apophysate corolla, elongate corolla lobes, and elongate anther sacs and tubules. As here considered, it includes two species with articulate calyces and one with continuous calyces. *E. alata* Hoer. is the type species.

KEY TO THE SPECIES

Calyx articulate with pedicel; corolla 30 mm. long or more.

Leaves pinnate-veined, crenate-serrate; calyx lobes triangular, 2 mm. long or less..... 1. *E. alata*.

Leaves pinnerved, entire; calyx lobes elongate, about 6 mm. long.

2. *E. calycina*.

Calyx continuous with pedicel; corolla less than 20 mm. long.

3. *E. loranthiflora*.

1. *Englerodoxa alata* Hoer. Bot. Jahrb. Engler 42: 311. 1909.

Subscandent shrub; branchlets angled or subterete, glabrous; petioles puberulous or glabrous, 2 to 5 mm. long, winged above; leaf blades ovate or oblong, 2 to 5 cm. long, 1 to 2.5 cm. broad, subattenuate at base, subacute and apiculate at apex, strongly revolute and serrate at margins (serrations about 5 per centimeter), glabrous, pinnate-veined, the secondary veins 2 or 3 per side, spreading, ascending at margins, with the midvein impressed above, prominent

beneath, the veinlets reticulate, plane above, slightly raised beneath; inflorescence axillary near ends of branchlets, short-racemose, glabrous in all parts; rachis striate, 1 to 3 cm. long, bracteate at base; pedicels rugose, 15 to 25 mm. long, stout (about 1.5 mm. in diameter near base, swollen to 2.5 mm. in diameter at apex), each subtended by an oblong acute bractlet up to 4 mm. long, bibracteolate slightly below middle, articulate with calyx; calyx tube prismatic, about 6 mm. long and 5 mm. in diameter at anthesis, narrowly winged to sinuses; limb spreading, 2 mm. long including lobes, the lobes subacute, about 1.5 mm. long; corolla 5-angled, strongly apophysate at base, 40 to 50 mm. long, 12 mm. in diameter across apophysis, 6 to 7 mm. in diameter above, the lobes lanceolate, 20 to 25 mm. long, 3 to 4 mm. across base, erect; filaments glabrous, nigrescent, about 4 mm. long; anther sacs incurved at base, about 16 mm. long; tubules very slender, erect, rigid, about 27 mm. long, opening by short oblique pores not more than 1.5 mm. long; stigma truncate.

TYPE LOCALITY: Volcano of Tunguragua, Province of Tunguragua, Ecuador. Type collected by Sodiro (no. 92/4c).

DISTRIBUTION: Mountains of Ecuador (and Peru?).

ECUADOR: *Pearce* (K).

TUNGURAGUA: Volcano of Tunguragua, *Sodiro* 92/4c (B, type); altitude about 3,900 meters, *Popenoe* 1292 (N).

ECUADOR OR PERU: *Lobb* 80 (K), 161 (K).

2. *Englerodoxa calycina* (Benth. & Hook.) A. C. Smith, sp. nov.

Ceratostema calycinum Benth. & Hook. Gen. Pl. 2: 570. 1876, nomen.

Anthopterus calycinus Spruce, Pl. exs. n. 5094, nomen.

Frutex; laminis oblongo-ovatis integerrimis basi attenuatis apice breviter acuminatis pli-nerviis; floribus racemosis minute puberulis; calyce cum pedicello articulado, limbo quam tubo duplo longiore, lobis elongato-triangularibus; corolla 5-angulata, lobis lanceolatis; filamentis distinctis glabris, tubulis rigidis gracillimis quam oculis paullo longioribus.

Shrub; branchlets subterete, glabrous, brownish; petioles thick (2 mm. in diameter), short (1 to 2 mm. long), glabrous, rugose, winged; leaf blades coriaceous, oblong-ovate, 6 to 8 cm. long, 3 to 3.5 cm. broad, glabrous, attenuate at base, decurrent on petiole, short-acuminate or acute at apex, entire and slightly revolute at margins, 5 to 7 pli-nerved, the secondary nerves sharply ascending, oriented at or near base, the midnerve and secondary nerves deeply impressed above, strongly prominent beneath, the veinlets plane above, slightly raised beneath; racemes axillary, 4 to 8 flowered; rachis subterete, striate, minutely puberulous, about 3 cm. long, bracteate at base with several imbricate ovate acuminate bracts 2 to 3 mm. long; pedicels stout (2 mm. in diameter), rugose, minutely puberulous, 15 to 20 mm. long, bibracteolate near middle with ovate acuminate bractlets about 3 mm. long, slightly swollen at apex, surmounted by a few minute cartilaginous teeth, faintly articulate with calyx; calyx and corolla finely puberulous without, the hairs pale, about 0.2 mm. long; calyx tube subcylindric, longitudinally furrowed, 2.5 mm. long, 3 to 4 mm. in diameter; limb erecto-patent, subcoriaceous, about 7 mm. long including lobes, the lobes elongate-triangular, subacute, 6 mm. long, 4 to 5 mm. broad at base; corolla 5-angled, often twisted, about 35 mm. long, 6 mm. in diameter at base, gradually contracted above, the lobes lanceolate, up to 12 mm. long; stamens erect; filaments coriaceous, glabrous, about 3 mm. long, 1 to 1.2 mm. broad at base, contracted into long slender connectives as long as the anther sacs; sacs 12 to 13 mm. long, the tubules very slender (each 0.2 mm. in diameter), about 14

mm. long, stiff, distinct but closely appressed to one another, opening by minute introrse oval clefts about 1 mm. long; style about 28 mm. long, the stigma truncate; disk shallowly cup-shaped, about 4 mm. in diameter.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected in the Andes of Ecuador by R. Spruce (no. 5094). Duplicates at G, Y.

DISTRIBUTION: Known only from the type collection.

From the preceding species *E. calycina* is distinguished by its entire pinnerved leaves and elongate calyx lobes. There has been no previous description of the species.

EXPLANATION OF PLATE 5.—*Englerodoxa calycina*, from photograph of type sheet. About one-half natural size.

3. *Englerodoxa loranthiflora* (Benth.) A. C. Smith.

Ceratostema loranthiflorum Benth. Pl. Hartw. 142. 1844.

Compact shrub; branches and branchlets subterete, glabrous, brownish, becoming gray with age; petioles stout (1.5 mm. in diameter), glabrous, rugose, 2 to 5 mm. long; leaf blades coriaceous, lanceolate-elliptic, 4 to 6.5 cm. long, 1.2 to 2 cm. broad, glabrous, cuneate at base, slightly decurrent on petiole, acute or subacute at apex, entire at margins, pinnate-veined, the secondary veins 3 to 5 to a side, the lower pair or two sharply ascending, subparallel to margin, the upper pairs short, spreading, the veins and veinlets plane above, raised beneath; racemes axillary, 5 to 8 flowered; rachis rugose, glabrous, stout (2 mm. in diameter), 8 to 20 mm. long, bracteate at base with several imbricate, ovate, subacute, deciduously ciliate-margined bracts 1.5 to 2 mm. long; pedicels stout (1.5 mm. in diameter), rugose, glabrous, 8 to 13 mm. long, bracteolate at or near the base with 1 or 2 bractlets resembling those of the rachis, swollen at apex, continuous with calyx; calyx and corolla glabrous; calyx tube urceolate, strongly rugose, 5 to 6 mm. long, 4 mm. in diameter at summit; limb spreading, subcoriaceous, 2 mm. long including lobes, the lobes 1.5 mm. long, 3 to 4 mm. broad at base, the sinuses subacute; corolla scarlet, carnose, cylindric, subrugose, 15 to 20 mm. long, 6 mm. in diameter near base, reduced above, the lobes erect, lanceolate, acute, 5 to 8 mm. long, 2 mm. broad at base, the sinuses sharp; stamens about as long as corolla, erect; filaments distinct or slightly coherent at base, submembranous, glabrous, about 2 mm. long, contracted into slender connectives as long as anther sacs; sacs strongly granular, 5.5 to 6.5 mm. long; tubules slender (each 0.25 mm. in diameter), 8 to 8.5 mm. long, rigid, opening by minute introrse oval oblique pores about 0.5 mm. long; style filiform, 18 mm. long, exserted, the stigma truncate.

TYPE LOCALITY: Loja, Province of Loja, Ecuador. Type collected by Hartweg (no. 787).

DISTRIBUTION: Mountains of southern Ecuador.

ECUADOR: Jameson (K).

LOJA: Loja, Hartweg 787 (K, type); Lobb (K). Chonta Cruz, Huebsch (K). Vicinity of Catamayo, Huebsch (K). Between La Toma and Loja, Hitchcock 21438 (N, Y).

This is a species resembling the two preceding in its deeply cleft corolla and long rigid tubules, but differing from them in having the calyx continuous with the pedicel. This character alone does not seem to merit generic rank, since the same conditions exist in the genera *Thibaudia* and *Ceratostema*.

6. GONOCALYX Planch. & Lind. Gard. Chron. 1856:152. 1856

Calyx tube articulate with pedicel, somewhat obprismatic; limb erecto-patent, 5-lobed, the lobes triangular, apiculate; corolla subcylindric, 5-lobed, the lobes

triangular, subacute; stamens 10, equal, nearly as long as corolla; filaments distinct, attached to the anther dorsally near its base; anthers elongate, the sacs granular, the tubules longer than the sacs, opening by minute subterminal pores; style filiform, about as long as corolla.

Small compact shrubs, sometimes epiphytic, with alternate, coriaceous, variously shaped leaves; flowers axillary, solitary or in pairs, or in loose few-flowered racemes; pedicels slender, bracteate at base.

DISTRIBUTION: Three species, one each in northern Colombia, Porto Rico, and Dominica, respectively.

The three species here included form a coherent group, although they have not previously been placed together. The genus is distinguished by the shallowly cleft cylindric corolla, the articulate calyx, the free filaments, and the slender tubules. *G. pulcher* Planch. & Lind. is the type species.

KEY TO THE SPECIES

Leaves orbicular-ovate, less than 3 cm. long, rounded or subacute at apex; tubules 3 or 4 times as long as locules.

Corolla 18 to 20 mm. long; tubules opening by short clefts up to 2 mm. long; leaf margin shallowly crenate (Colombia)----- 1. *G. pulcher*.

Corolla 12 to 15 mm. long; tubules opening by subterminal pores not more than 0.5 mm. long; leaf margin entire (Porto Rico)- 2. *G. portoricensis*.
Leaves ovate, 5 to 10 cm. long, acuminate at apex; tubules less than twice as long as locules (Dominica)----- 3. *G. smilacifolius*.

1. *Gonocalyx pulcher* Planch. & Lind. Gard. Chron. 1856:152. 1856.

Shrub; branchlets purplish and angled when young, becoming subterete and brownish, glabrous; petioles puberulous or glabrous, subterete, 2 to 4 mm. long; leaf blades ovate, 18 to 27 mm. long, 10 to 18 mm. broad, rounded and minutely apiculate at apex, cuneate at base, crenate at margins (crenations 4 or 5 per centimeter), glabrous, 5 to 7 nerved, the secondary nerves oriented from base or slightly above, ascending, with the midnerve slightly raised above, plane or slightly raised beneath, the veinlets reticulate, slightly raised above, obscure beneath; flowers axillary toward ends of branchlets, solitary or in pairs; pedicels striate, 15 to 18 mm. long, glabrous, circumscribed at base by a few imbricate ovate bractlets up to 2 mm. long, bibracteolate near base, surmounted by a few minute deciduous cartilaginous teeth, articulate with calyx; calyx tube subcylindric, about 3 mm. long and 3.5 mm. in diameter at anthesis, slightly angled to sinuses, glabrous; limb erect, about 3 mm. long including lobes, the lobes about 1 mm. long; corolla cylindric, about 20 mm. long, 3 to 3.5 mm. in diameter, glabrous without, white-tomentose distally within, the lobes about 2 mm. long; filaments nigrescent, glabrous or sparsely pubescent at margins, about 3.5 mm. long; anther sacs incurved at base, about 4 mm. long; tubules slender, about 11 mm. long, opening by short distal clefts about 2 mm. long; style slightly exserted, the stigma truncate.

TYPE LOCALITY: "Provinces of Pamplona and Ocaña," Department of Norte de Santander, Colombia, altitude about 2,150 meters. Type collected by Schlim.

DISTRIBUTION: Andes of northeastern Colombia.

COLOMBIA: *Purdie* (G, K).

CULTIVATED PLANT: (K, type, raised from original.)

This species and the following are very closely allied and form a distinct genus; the alliance of the third species with them is questionable.

2. *Gonocalyx portoricensis* (Urban) A. C. Smith.*Thibaudia portoricensis* Urban, Symb. Antill. 1:376. 1899.*Ceratostema portoricense* Hoer. Bot. Jahrb. Engler 42:276. 1909.

Low slender branching shrub; branchlets subterete, glabrous; petioles slender, glabrous, 1.5 to 3 mm. long; leaf blades subrotund, 10 to 20 mm. long, 8 to 16 mm. broad, rounded at base, rounded or minutely apiculate at apex, subentire and strongly revolute at margins, glabrous, obscurely 3-nerved, the midnerve slightly impressed above, raised beneath, the secondary nerves ascending from base, near margins, obscure, plane; flowers few, axillary, apparently solitary; pedicels subterete, glabrous, 7 to 9 mm. long, bracteolate at base with a few imbricate ovate bractlets up to 2 mm. long, fringed at summit by a few deciduous glandular hairs, articulate with calyx; calyx tube about 2.5 mm. long and 2.5 mm. in diameter at anthesis, narrowly 5-winged to sinuses; limb 2 mm. long including lobes, the lobes less than 1 mm. long; corolla cylindric, 12 to 14 mm. long and 3 mm. in diameter, broader above, glabrous, the lobes about 2 mm. long; filaments castaneous, about 1.5 mm. long, slightly puberulous distally or glabrous; anther sacs 2.5 mm. long; tubules erect, slender, about 10 mm. long, opening by minute subterminal pores about 0.5 mm. long.

TYPE LOCALITY: Sierra de Luquillo, Mount Jiménez, Porto Rico. Type collected by Sintenis (no. 1363).

DISTRIBUTION: Mountains of Porto Rico.

PORTO RICO: *Blauner*, in 1852 or 1853 (Y). Mount Jiménez, *Sintenis* 1363 (type collection, F, G, N, Y). El Yunque, *Britton & Bruner* 7618 (Y); *Boymton* 8216 (Y); about 1,050 meters, *Gleason & Cook* M186 (Y). Sierra de Naguabo, 690 to 1,035 meters, *Shafer* 3641 (F, G, N, Y).

EXPLANATION OF PLATE 6.—*Gonocalyx portoricensis*, from photograph of sheet of type collection in the U. S. National Herbarium. About one-half natural size.

3. *Gonocalyx smilacifolius* (Griseb.) A. C. Smith.*Vaccinium smilacifolium* Griseb. Fl. Brit. W. Ind. 144. 1859.*Hornemannia smilacifolia* Benth. & Hook. Gen. Pl. 2:567. 1876.*Ceratostema smilacifolium* Hoer. Bot. Jahrb. Engler 42:276. 1909.

Shrub; branchlets terete, cinereous; petioles terete, glabrous, 5 to 7 mm. long, stout, about 2 mm. in diameter; leaf blades ovate, 7 to 10 cm. long, 5 to 6 cm. broad, rounded or subcuneate at base, abruptly acuminate at apex, entire and slightly revolute at margins, glabrous, 5 to 7 nerved, the secondary nerves oriented from or near base, arcuate, with the midnerve slightly impressed or plane above, prominent beneath, the veinlets copiously reticulate, plane or obscure above, slightly raised beneath; inflorescence axillary towards ends of branchlets, loosely racemose, 4 to 8 flowered, glabrous in all parts; rachis terete, slender, 2 to 5 cm. long; pedicels rugose, 10 to 18 mm. long, cylindric (0.5 mm. in diameter at base, swollen to nearly 1 mm. in diameter distally), bibracteolate near base with ovate bractlets about 1.3 mm. long, articulate with calyx; calyx tube subcylindric, about 4 mm. long and 3 mm. in diameter at anthesis, narrowly winged to sinuses; limb suberect, 2 to 2.5 mm. long including lobes, the lobes less than 1 mm. long, faintly ciliate at margins; corolla cylindric, about 7 mm. long and 4 mm. in diameter; filaments about 2 mm. long, glabrous; anther sacs abruptly narrowed at base, about 2.5 mm. long; tubules very slender, about 3.5 mm. long, opening by minute subterminal pores less than 0.5 mm. long; stigma truncate.

TYPE LOCALITY: Coulabion Mountains, Dominica. Type collected by Imray.

DISTRIBUTION: Dominica.

DOMINICA: *Eggers* 1038 (K); *Lloyd* 302 (Y). Coulabion Mountains, *Imray* (G, type collection).

This species is very distinct from the two preceding and its place in the genus may be questioned. However, it is surely not a *Ceratostema*, and the flower structure is so close to that of the two preceding species of *Gonocalyx* that the great difference in leaves may be considered of secondary importance.

7. SIPHONANDRA Klotzsch, *Linnaea* 24: 24. 1851

(*Siphonostema* Griseb.; Lechl. Berb. Amer. Austr. 58. 1857, nomen)

Calyx tube articulate with pedicel, short-cylindric; limb subspreading, the lobes 5, triangular, acute; corolla cylindric, 5-lobed, the lobes triangular, subacute; stamens 10, equal, nearly as long as corolla; filaments membranous, connate, attached to the anther dorsally near its base; anthers elongate, the sacs granular, the tubules much longer than the sacs, opening by strictly terminal flaring pores; style filiform, frequently exserted.

Small compact shrubs, often epiphytic, with small alternate, somewhat crowded, coriaceous, pinnate-veined, petioled, oblong leaves; inflorescence axillary, short-racemose; flowers pediceled, several to many to an inflorescence; pedicels rugose, deciduously bibracteolate.

DISTRIBUTION: Andes of southern Peru and northern Bolivia at high elevations. Two species are known.

This genus is characterized by connate filaments, terminal pores in the slender tubules, and an articulate calyx. Its relationship to other members of the group has been previously discussed. *S. elliptica* (R. & P.) Klotzsch is the type species.

KEY TO THE SPECIES

Pedicels and calyces persistently pubescent, the hairs crowded, pale, about 0.3 mm. long----- 1. *S. pilosa*.

Pedicels and calyces essentially glabrous (hairs, if present, sparse and lax).
2. *S. elliptica*.

1. *Siphonandra pilosa* A. C. Smith, sp. nov.

Siphonostema costatum Griseb.; Lechl. Berb. Amer. Austr. 58. 1857, nomen.

Frutex; ramulis petiolisque puberulis; laminis oblongis vel leviter obovatis basi cuneatis apice subacutis subtus parce pilosis pinnatinerviis; inflorescentia racemosa ubique breviter pilosa; calyce cylindrico, limbo tubum subaequante; corolla cylindrica; staminibus aequalibus, filamentis glabris connatis, tubulis gracilibus erectis quam loculis 4 ad 5-plo longioribus poris terminalibus dehiscentibus.

Shrub; branchlets subterete, stout, pale puberulous; petioles subterete, rugose, 3 to 5 mm. long, puberulous or glabrous; leaf blades oblong or slightly obovate, 3 to 4.5 cm. long, 1 to 2 cm. broad, cuneate at base, obtuse or subacute at apex, entire and slightly revolute at margins, essentially glabrous above, sparsely pilose beneath (hairs pale, scattered, lax, about 0.4 mm. long), the venation pinnate, the midvein deeply impressed above, somewhat prominent beneath, the secondary veins 3 or 4 to a side, ascending, slightly impressed above, plane beneath, the veinlets reticulate, obscure; inflorescence axillary at ends of branchlets, racemose, 8 to 15 flowered; rachis 1.5 to 2.5 cm. long, pilose (hairs copious, pale, about 0.3 mm. long), bracteate at base with several ovate bracts about 2 mm. long; pedicels rugose, pilose as the rachis, 8 to 13 mm. long, bracteate near base (bracts several, ovate, acuminate, about 1.5 mm. long).

ciliate-margined), articulate with calyx; calyx tube cylindric, about 4 mm. long and 2.5 mm. in diameter at anthesis, pilose with short pale spreading hairs; limb spreading, about 3.5 mm. long including lobes, the lobes about 1.5 mm. long and 3 mm. across; corolla cylindric, about 26 mm. long and 5 mm. in diameter, sparsely pilose or glabrous, the lobes triangular, subacute, about 1.5 mm. long; stamens about 25 mm. long; filaments castaneous, firmly connate in a ring, about 5 mm. long, glabrous; anther sacs granular, incurved and faintly setose at base, about 4 mm. long; tubules membranous, erect, about 18 mm. long, slender, 0.3 mm. or less in diameter, opening by strictly terminal flaring pores; style slightly exserted, the stigma peltate; fruit elliptic-ovoid, sparsely pilose, up to 1 cm. long, the calyx limb decurrent.

Type in the herbarium of the New York Botanical Garden, collected in the vicinity of Tacacoma, Cerro de Tuile, Province of Larecaja, Department of La Paz, Bolivia, altitude 3,350 meters, May or June, 1860, by G. Mandon (no. 549). Duplicates at G, K.

DISTRIBUTION: Southern Peru and northern Bolivia.

PERU: Tabina, *Lechler* 2053 (K).

The persistent pubescence of the pedicels and calyces separates this species from the following.

2. *Siphonandra elliptica* (R. & P.) Klotzsch, *Linnaea* 24: 24. 1851.

Thibaudia elliptica R. & P. *Fl. Peruv. Chil.* 4: pl. 384. 1802.

Siphonostema myrtifolium Griseb.; *Lechl. Berb. Amer. Austr.* 58. 1857, nomen.

Ceratostema ellipticum Benth. & Hook. *Gen. Pl.* 2: 570. 1876.

Eurygania elliptica Britton, *Bull. Torrey Club* 20: 137. 1893.

Ceratostema hookeri Britton, *Bull. Torrey Club* 20: 137. 1893.

Ceratostema weberbaueri Hoer. *Bot. Jahrb. Engler* 42: 316. 1909.

Shrub; branchlets subterete, brownish, slightly puberulous when young, becoming glabrous; petioles subterete, glabrous, 4 to 5 mm. long; leaf blades oblong or ovate-oblong, 3.5 to 5.5 cm. long, 1.5 to 2.5 cm. broad, cuneate at base, obtuse or subacute at apex, entire or faintly crenulate and slightly revolute at margins, glabrous or sparsely brownish-pilose above, sparsely pilose beneath (hairs scattered, appressed, dark brown, about 0.5 mm. long), becoming glabrous, the venation pinnate, the midvein impressed above, prominent beneath, the secondary veins 3 to 5 to a side, spreading, ascending at margin, slightly impressed above, raised beneath, the veinlets copiously reticulate, plane; inflorescence axillary near ends of branches, racemose, 5 to 15 flowered; rachis 2 to 5 cm. long, glabrous or slightly pilose with pale spreading hairs up to 0.3 mm. long, striate, deciduously bracteate at base with several ovate bractlets about 1.5 mm. long; pedicels sparsely pilose or glabrous, rugose, 7 to 20 mm. long, bilbracteolate toward base (bracts ovate, acuminate, ciliate-margined, up to 3 mm. long), surmounted by several minute cartilaginous teeth; calyx tube about 3.5 mm. long and 2.5 mm. in diameter at anthesis, essentially glabrous; limb 4 to 4.5 mm. long including lobes, the lobes up to 2 mm. long; corolla about 25 mm. long and 4 mm. in diameter, essentially glabrous, the lobes obtuse, about 1 mm. long; filaments glabrous, about 6 mm. long; anther sacs incurved at base, 5 mm. long; tubules erect, slender, less than 0.4 mm. in diameter; style about as long as corolla, the stigma peltate; fruit cylindric-ovoid, glabrous, up to 12 mm. long, the calyx limb decurrent.

TYPE LOCALITY: Peru. Type collected by Ruiz and Pavon.

ILLUSTRATION: Hook. *Icon. Pl.* 2: pl. 108. 1837.

DISTRIBUTION: Andes of Peru and northern Bolivia, altitude 3,000 to 3,900 meters.

PERU: Huanacabra, *Mathews* 884 (K). San Gavan, *Lechler* 2276 (K).

APURIMAC: Río Pinkos, *Weberbauer* 5861 (B, F, N).

CUZCO: Sandía, *Weberbauer* 740 (B, type of *Ceratostema weberbaueri*).

Cosñipata, *Weberbauer* 6929 (B, F, N). Cerro de Cusilluyoc, *Pennell* 13857 (F, N, Y). Cedrobamba, *Heller* 2190 (N).

BOLIVIA: Eastern Andes, *Pearce* 790 (K).

LA PAZ: Mapiri, *Rusby* 2036 (B, F, G, N, Y). Cocopunco, *Tate* 371 (Y).

Between Okara and Ancoma, *Tate* 862 (Y).

COCHABAMBA: Cochabamba, *Bang* 2003 (Y). Cejawald, *Steinbach* 9529 (Y).

There has been a good deal of disagreement as to the generic position of this species, but as pointed out in the discussion of genera at the beginning of this treatment, it seems to fall into a distinct genus as founded by Klotzsch. Although I have not seen the type of the species, the descriptions and the two available plates agree with the above-cited specimens, including the type of *Ceratostema weberbaueri*.

8. PERICLESIA A. C. Smith, gen. nov.

Calyx cum pedicello articulatus, tubo late obconico, limbo magno erecto 4-lobato, lobis lanceolato-triangularibus. Corolla anguste cylindrica 4-lobata, lobis lanceolatis. Stamina 8 corollam subaequantia, filamentis connatis, antheris elongatis, tubulis gracilibus quam loculis multo longioribus poris obliquis dehiscentibus. Frutex (epiphyticus?), laminis coriaceis alternis petiolatis obscure pli-nerviis. Inflorescentia 1 vel 2-flora subterminalis.

Calyx tube articulate with pedicel, broadly obconical; limb large, suberect, 4-lobed, the lobes lanceolate-deltoid, acute; corolla narrowly cylindric, 4-lobed, the lobes lanceolate; stamens 8, nearly as long as corolla; filaments membranous, connate; anthers elongate, the sacs granular, the tubules much longer than the sacs, opening by oblique pores; style filiform, about as long as corolla.

Low slender shrubs, perhaps epiphytic, with alternate, coriaceous, obscurely pli-nerved, petioled leaves; inflorescence 1 or 2 flowered, subterminal; flowers pedicelled, the pedicels striate, bracteolate.

DISTRIBUTION: Known only from a single species, the exact geographic locality for which is a matter of doubt. It is from the Andes of either Colombia or Peru.

This genus is immediately recognized by its four large calyx lobes, its connate filaments, and its slender tubules with oblique pores.

Following Klotzsch's custom of naming genera of Vacciniaceae after historical figures, this genus is dedicated to the Greek statesman Pericles.

1. *Periclesia flexuosa* A. C. Smith, sp. nov.

Frutex gracilis generis characteribus; ramulis petiolisque decidue puberulis; laminis lanceolato-oblongis basi attenuatis apice obtuse acuminatis obscure 3 ad 5 pli-nerviis; floribus ut supra descriptis.

Slender shrub, probably epiphytic; branchlets subterete, striate, slender, deciduously puberulous with pale spreading hairs up to 0.2 mm. long; petioles subrugose, about 2 mm. long, deciduously puberulous; leaf blades lanceolate-oblong, 4 to 6 cm. long, 1.2 to 1.8 cm. broad, attenuate at base, obtusely acuminate at apex, entire and narrowly revolute at margins, glabrous on both surfaces, obscurely 3 to 5 pli-nerved, the midnerve slightly impressed above, prominent beneath, the secondary nerves obscure, ascending; inflorescence terminal (or axillary?); flowers solitary or in pairs, the pedicels, calyx tube, and corolla densely pilose, the hairs pale, spreading, up to 0.4 mm. long; pedicels striate,

about 15 mm. long, bracteolate at base and bibracteolate near middle with lanceolate puberulous bractlets 4 to 6 mm. long, articulate with calyx; calyx tube broadly obconical, 3 to 4 mm. long, 3 mm. in diameter at summit at anthesis; limb large, flaring, 20 to 25 mm. long including lobes, the lobes 4, lanceolate-deltoid, acute, membranous, closely reticulate-veined, sparsely pilose at margins, 20 to 25 mm. long, 10 to 12 mm. broad at base; corolla submembranous, about 50 mm. long, 6 to 10 mm. in diameter at base, gradually tapering distally, 4-lobed, the lobes lanceolate, long-acuminate, about 20 mm. long, 3 to 4 mm. across base; stamens 8, nearly as long as corolla; filaments castaneous, membranous, firmly connate in a tube, about 7 mm. long, sparsely pilose at distal margins with hairs about 0.5 mm. long; anthers rigidly erect, the sacs granular, stout, incurved at base, 5 to 6 mm. long, the tubules membranous, very slender, less than 0.3 mm. in diameter at apex, about 35 mm. long, opening by oblique pores 0.5 mm. long; style filiform, as long as corolla, striate, the stigma truncate or subpeltate.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected in woods at "Rosario, Columbia," altitude 1,550 meters, by W. Lobb (no. 79).

DISTRIBUTION: Known only from the type collection.

This beautiful plant is the only species of the genus yet discovered. The doubt concerning the exact locality of the collection of Lobb's plants labeled "Columbia"—whether Colombia or Peru—makes it impossible to assign this genus a definite geographic range.

EXPLANATION OF PLATE 7.—*Periclesia flexuosa*, from photograph of type sheet. About one-half natural size.

9. OREANTHES Benth. Pl. Hartw. 140. 1844

Calyx tube continuous with pedicel, cylindric, often falcate; limb suberect, 5-lobed, the lobes lanceolate, acute; corolla cylindric, 5-lobed, the lobes broadly ovate; stamens 5, equal, nearly as long as corolla; filaments membranous, connate, attached to the anther sacs at about the middle; anthers elongate, the sacs nearly smooth, the tubules longer than the sacs, opening by minute oblique pores; style filiform, slightly exserted.

Low slender epiphytic shrub, with small, coriaceous, alternate, obscurely 5-nerved, ovate leaves, the petioles very short; flowers axillary, solitary or in pairs; pedicels short, minutely bracteate at base.

DISTRIBUTION: One species, in the Andes of Ecuador.

This very distinct genus is distinguished by having only five stamens, elongate calyx lobes, ovate corolla lobes, oblique pores, and an elongate subsessile calyx tube.

1. *Oreanthes buxifolius* Benth. Pl. Hartw. 140. 1844.

Low slender shrub; branchlets subterete, glabrous or short-pilose; petioles slender, glabrous, 1 to 2 mm. long; leaf blades ovate, 2 to 3 cm. long, 1.2 to 1.6 cm. broad, rounded or subcuneate at base, rounded at apex, entire and slightly revolute at margins, glabrous, 5-nerved, the secondary nerves oriented from base or slightly above, with the midnerve slightly raised on both surfaces, somewhat obscure, the veinlets copiously reticulate, obscure in mature leaves; flowers few, axillary, solitary or in pairs; pedicels minute, less than 1 mm. long, bibracteolate at base with ovate triangular bractlets up to 2 mm. long; calyx tube 3 to 5 mm. long, 1 to 1.5 mm. in diameter at anthesis, deciduously pilose with pale hairs about 0.3 mm. long; limb about 6 mm. long including lobes, glabrous, the lobes 5 to 9 mm. long, 1 to 2 mm. across base; corolla about 25 mm. long and 3 mm. in diameter, flaring at apex, glabrous, the lobes suberect, blunt, 5 mm. long and 3 mm. across; filaments castaneous, 9 mm.

long, glabrous; anther sacs about 9 mm. long; tubules very slender, about 12 mm. long, opening by a minute pore less than 0.5 mm. long; stigma peltate; fruit subcylindric, rugose, about 10 mm. long and 2.5 mm. in diameter, surmounted by the persistent calyx lobes.

TYPE LOCALITY: Mount El Sisme, near Loja, Province of Loja, Ecuador. Type collected by Hartweg (no. 783).

DISTRIBUTION: Known only from the type collection.

ECUADOR.

LOJA: Mount El Sisme, near Loja, *Hartweg* 783 (K, type).

The only species of a very distinct genus.

10. MYCERINUS A. C. Smith, Bull. Torrey Club 58: 441. 1931

Calyx articulate with pedicel, turbinate, the base cuneate, the limb dilated, 5-lobed, narrowly winged, each wing continuing to the apex of a lobe; corolla cylindric, carnose, 5-lobed; stamens 10, equal, shorter than corolla; filaments stout, glabrous, distinct, continued into short connectives which divide into 2 slender arms each of which continues to the apex of a tubule; anthers stout, the sacs finely granular, the tubules 2, short, membranous, dehiscing by introrse oval clefts; style stout, the stigma truncate.

A low shrub, the branches and branchlets subterete, glabrous; leaves alternate, thick-coriaceous, short-petiolate, pinnate-veined, rounded or subcuneate at base, obtuse at apex, entire and strongly recurved at margins; inflorescence few-flowered, fasciculate or short-racemose, the flowers pedicellate, the pedicels deciduously bracteolate.

DISTRIBUTION: One species thus far known, from Mount Duida in southern Venezuela.

As previously mentioned, this genus is distinguished from *Macleania* by having its calyx wings opposite the lobes and its divided connective extended to the summit of the tubules.

1. *Mycerinus sclerophyllus* A. C. Smith, Bull. Torrey Club 58: 442, pl. 36. 1931.

Low shrub; branchlets angled, glabrous; petioles thick, 2 to 5 mm. long, sometimes winged distally; leaf blades thick-coriaceous, ovate-oblong, 4 to 6 cm. long, 2 to 3 cm. broad (appearing narrower because of revolute margins), sparsely black-punctate on both surfaces, obtuse at apex, rounded or subcuneate at base, much thickened and loosely revolute at margins, pinnate-veined, the midvein impressed above, prominent beneath, the secondary veins 6 to 8 to a side, spreading, plane or slightly impressed above, raised beneath, the veinlets reticulate, obscure or plane; flowers fasciculate or short-racemose, 2 to 4 to an inflorescence; pedicels subterete, 15 to 20 mm. long, stout, glabrous, deciduously minute-bracteolate at base and summit; calyx coriaceous, about 8 mm. long, 5 to 6 mm. in diameter near summit, winged for entire length by 5 fleshy coriaceous wings, each of which continues to the apex of a calyx lobe, the lobes incurved, triangular, acute, about 3.5 mm. across base and 2 mm. long; corolla tubular, subcylindric, about 6 mm. long and 5 mm. in diameter at middle (not quite mature); stamens about 4 mm. long; filaments castaneous, carnose, 2 mm. long, loosely connate at base; anther sacs about 3 mm. long, stout, the tubules separable to their bases, opening by clefts about 0.8 mm. long; style cylindric, about 6 mm. long.

TYPE LOCALITY: Summit of Mount Duida, State of Amazonas, Venezuela, altitude about 2,200 meters. Type collected by G. H. H. Tate (no. 603).

DISTRIBUTION: Known only from the type collection.

VENEZUELA.

AMAZONAS: Summit of Mount Duida, *Tate* 603 (Y, type).

11. *MACLEANIA* Hook. Icon. Pl. 2: pl. 109. 1837(? *Birania* Neraud; Freyc. Voy. Uran. Bot. 28. 1826, nomen)(*Tyria* Klotzsch, Linnaea 24: 21. 1851)

Calyx tube articulate with pedicel, short-cylindric or campanulate; limb erecto-patent, 5 (rarely 3 or 4) lobed, the lobes triangular, subacute; corolla subcylindric or elongate-urceolate, 5-lobed, the lobes triangular, subacute; stamens 10 (rarely fewer), equal, usually half as long as corolla; filaments distinct or connate, attached to the anther dorsally near its base; anthers stout, the sacs strongly granular, the tubules about as long as the sacs, laterally connate or fused into a single tubule (rarely completely distinct), opening by elongate distinct or fused clefts; style filiform, about as long as corolla or exserted.

Compact shrubs, often epiphytic, with coriaceous alternate pinnate-veined or pinnately-nerved leaves; inflorescence axillary or terminal, subfasciculate or racemose; flowers pedicelled, few to many to an inflorescence; pedicels deciduously bibracteolate.

DISTRIBUTION: Continental tropical America from southern Mexico to Peru, usually at high altitudes. Thirty-two species are here described, and in addition there are two names which I am unable to place.

The relationship of *Macleania* to other members of the tribe has already been thoroughly discussed. It is characterized by its conical fused or connate tubules and its unspurred connectives. *M. floribunda* Hook. is the type species.

KEY TO THE SPECIES

Anthers produced into a single tubule.

Filaments connate most of their length; corolla glabrous (or sparsely pilose in no. 15).

Leaf base cuneate (rarely subtruncate).

Mature corolla more than 30 mm. long, 3 times as long as stamens.

Leaves and flowers glabrous; calyx lobes triangular, about 1.5 mm. long----- 1. *M. longiflora*.

Leaves (especially beneath) and flowers (especially pedicels and calyces) farinose with minute reddish hairs; calyx lobes apiculate, about 0.5 mm. long----- 2. *M. macrantha*.

Mature corolla up to 22 mm. long, twice as long as stamens.

Lower surface of leaves and flowers pilose with minute stout reddish hairs----- 3. *M. floribunda*.

Lower surface of leaves and flowers essentially glabrous (or sparsely pilose with pale lax hairs).

Corolla cylindric; leaves narrowly ovate, up to 2.5 cm. broad, attenuate at base, appearing sessile (petiole not more than 2 mm. long, winged)----- 4. *M. antioquiae*.

Corolla 5-angled; leaves broadly ovate, up to 4.5 cm. broad, truncate or cuneate at base; petiole 2 to 5 mm. long.

Flowers 4 or more to an inflorescence; corolla about 15 mm. long (Colombia) ----- 5. *M. stricta*.

Flowers 3 to an inflorescence; corolla more than 20 mm. long (Peru) ----- 6. *M. angulata*.

Leaf base cordate or subcordate (rarely truncate).

Calyx wings produced beyond lobes, forming perpendicular spurlike appendages; corolla lobes frequently spurred----- 7. *M. pentaptera*.

Calyx wings not produced beyond lobes (or slightly so in no. 14).

Leaves amplexicaul.

Inflorescence short-racemose; calyx lobes apiculate, less than 0.5 mm. long ----- 8. *M. rotundifolia*.

Inflorescence subfasciculate; calyx lobes deltoid, about 2 mm. long. 9. *M. amplexicaulis*.

Leaves not amplexicaul.

Calyx lobes triangular-acute, 1.5 to 2 mm. long, the sinuses acute (Costa Rica and Panama)----- 10. *M. ovata*

Calyx lobes apiculate, up to 1 mm. long, the sinuses rounded or obtuse. Leaves linear-lanceolate, at least 5 times as long as broad, acute at apex----- 11. *M. linearifolia*

Leaves ovate, 2 or 3 times as long as broad, blunt at apex. Inflorescence glabrous.

Flowers small (pedicel 3 to 5 mm. long; corolla 15 to 16 mm. long; stamens 6.5 mm. long)----- 12. *M. compacta*

Flowers comparatively large (pedicel 10 mm. long or more; corolla 20 to 25 (rarely 18) mm. long; stamens 9 to 11 mm. long).

Inflorescence fasciculate; calyx wings not distally produced (Mexico and Guatemala)----- 13. *M. insignis*.

Inflorescence short-racemose; calyx wings slightly produced distally (South America)----- 14. *M. cordifolia*.

Inflorescence pilose (hairs lax, pale, 0.2 to 0.4 mm. long).

15. *M. punctata*.

Filaments distinct; corolla densely pilose.

Calyx lobes apiculate, about 1 mm. long; flowers 5-merous.

16. *M. pubiflora*.

Calyx lobes elongate-triangular, 4 to 7 mm. long; flowers 5 or 6-merous.

17. *M. salapa*.

Anthers produced into two tubules (these usually laterally connate).

Pedicels and calyx glabrous or essentially so.

Leaves deltoid ----- 18. *M. euryphylla*.

Leaves ovate, ovate-lanceolate, or oblong.

Rachis stout, 10 to 20 cm. long at maturity; flowers large (calyx 10 to 12 mm. across summit; corolla 7 to 10 mm. in diameter near base; stamens 14 mm. long or more); leaves 12 to 25 cm. long.

19. *M. crassa*.

Rachis rarely up to 7 cm. long; flowers smaller than above dimensions; leaves seldom up to 15 cm. long.

Leaves glabrous beneath, variously shaped.

Bracts at base of inflorescence numerous, imbricate, oblong-lanceolate, up to 8 mm. long----- 20. *M. benthamiana*.

Bracts at base of inflorescence few, ovate-deltoid, not more than 4 mm. long.

Calyx lobes 5; stamens 10.

Leaves oblong or ovate-oblong, rarely up to 12 cm. long, the veinlets immersed; corolla carnose.

Tubules about as long as anther sacs or slightly longer (never twice as long).

Leaves oblong-spatulate, attenuate at base.

21. *M. poortmanni*.

Leaves oblong or oblong-ovate, cuneate or rounded at base.

Pedicels shorter than flowers or subequal; leaves subacute or hardly rounded at base.

Anthers slender, the tubules about 1.5 times as long as sacs----- 22. *M. pilgeriana*.

Anthers comparatively stout, the tubules about as long as sacs.

Tubules slightly shorter than anther sacs, rarely subequal (South America)----- 23. *M. nitida*.

Tubules slightly longer than anther sacs, rarely subequal (Central America)----- 24. *M. glabra*.

Pedicels longer than flowers; leaves rounded at base (Santa Marta Mountains)----- 25. *M. robusta*.

Tubules twice as long as anther sacs----- 26. *M. attenuata*.

Leaves oblong-lanceolate, rounded at base, 10 to 15 cm. long, the veinlets raised above; corolla soft-carnose-- 27. *M. nervosa*.

Calyx lobes 3 or 4; stamens 6 to 8----- 28. *M. reducta*.

Leaves laxly pale-pilose beneath, broadly ovate, the nerves prominent beneath----- 29. *M. ecuadorensis*.

Pedicels and calyx pubescent or densely farinose.

Inflorescence short-racemose, laxly pilose; leaves oblong, glabrous or laxly pilose beneath (Colombia and Ecuador).

Calyx robust, the limb 5 to 7 mm. long; lower surface of leaves glabrous or essentially so----- 30. *M. loeseneriana*.

Calyx smaller, the limb up to 4 mm. long; lower surface of leaves laxly pilose (glabrous when senescent)----- 31. *M. hirtiflora*.

Inflorescence subfasciculate, densely and closely farinose; leaves obovate, farinose beneath (Peru)----- 32. *M. farinosa*.

1. *Macleania longiflora* Lindl. Bot. Reg. 30: pl. 25. 1844.

Macleania tenuiflora Walp. Repert. Bot. 6: 415. 1847.

Low shrub, probably epiphytic; branchlets slender, terete, clothed with loose cinereous glabrous bark; petioles rugose, glabrous, 4 to 7 mm. long; leaf blades coriaceous, ovate, 6 to 10 cm. long, 2.5 to 5 cm. broad, rounded or broadly cuneate at base, acute at apex, entire at margins, glabrous on both surfaces, 5 to 7 pinnately-veined or pinnate-veined from near base, the midvein slightly impressed above, raised beneath, the secondary veins nearly plane above, slightly raised beneath, the veinlets reticulate, plane or obscure; inflorescence axillary, subfasciculate or short-racemose (rachis not exceeding 5 mm. in length), 3 to 10 flowered, essentially glabrous in all parts; pedicels rugose, 7 to 12 mm. long, each subtended by an ovate bractlet about 2 mm. long, minutely bibracteolate below middle; calyx tube obprismatic, about 4 mm. long and 4 mm. in diameter at anthesis, narrowly winged to sinuses; limb 3 to 5 mm. long including lobes, the lobes 5, broadly triangular, 1.5 mm. long, 5 to 6 mm. across; corolla subcylindric, 30 to 40 mm. long, 5 to 7 mm. in diameter near base, contracted at the long throat, minutely puberulous or glabrous, the lobes about 2 mm. long; stamens 10, equal, 11 to 12 mm. long; filaments nigrescent, coherent in a tube, 2.5 to 4 mm. long, glabrous or sparsely puberulous at distal margins; anther sacs 5.5 to 7 mm. long; tubule single, membranous, elongate-conical, 2.5 to 4 mm. long, opening by a wide introrse pore nearly as long; style about as long as corolla, the stigma truncate.

TYPE LOCALITY: Near Loja, Province of Loja, Ecuador, altitude about 2,500 meters. Type collection not cited.

DISTRIBUTION: Colombia and Ecuador, apparently rare and local in distribution.

COLOMBIA.

NORTE DE SANTANDER: Diamanta, 1,000 meters, *Kalbreyer* 1085 (B).

ECUADOR.

PICHINCHA: Vicinity of Mount Pichincha, *Jameson* (K); *Sodi* 92/2b (B).

The occurrence of this beautiful plant in northern Colombia is surprising, but the *Kalbreyer* collection is almost certainly conspecific with the Ecuadorian specimens.

2. *Macleania macrantha* Benth. Pl. Hartw. 223. 1846.

Shrub; branchlets terete, glabrous or puberulous with minute pale hairs; petioles stout, 1 to 3 mm. long, winged above; leaf blades coriaceous, ovate, 4 to 9 cm. long, 1.5 to 4 cm. broad, cuneate at base, obtuse or obtusely acuminate at apex, entire and slightly revolute at margins, essentially glabrous above, sparsely pubescent beneath with scattered stiff brown hairs about 0.2 mm. long, 5 to 7 pli-nerved, the nerves impressed above, prominent beneath, the veinlets reticulate, plane; inflorescence axillary near ends of branchlets, fasciculate, 2 to 7 flowered, circumscribed at base by numerous imbricate ovate bractlets about 1.5 mm. long, the pedicels and flowers densely short-pubescent when young (hairs brown, appressed, about 0.2 mm. long), becoming glabrous; pedicels rugose, 7 to 12 mm. long, deciduously bibracteolate near base, obscurely articulate with calyx; calyx tube obpyramidal, 6 to 7 mm. long and 3 mm. in diameter at summit at anthesis, winged to sinuses (wings about 0.5 mm. broad); limb 2 to 3 mm. long, the lobes 5, apiculate, 1 mm. long, 3 mm. broad; corolla cylindric, 27 to 40 mm. long, 4 to 5 mm. in diameter, contracted to a long throat 3 mm. in diameter, the lobes spreading, about 2.5 mm. long; stamens 10, 11 to 12 mm. long; filaments glabrous, connate in a tube, about 4.5 mm. long; anther sacs 5 to 5.5 mm. long; tubule single, rigid, conical, about 3 mm. long, opening by an introrse distal pore about 2 mm. long.

TYPE LOCALITY: Guayan, western slopes of Mount Pichincha, Province of Pichincha, Ecuador. Type collected by Hartweg (no. 1218*).

DISTRIBUTION: Andes of southern Colombia and northern Ecuador.

COLOMBIA.

NARIÑO: Tuqueres, 2,000 meters, *Triana* 2708 (K).

COLOMBIA OR ECUADOR: *André* (K); *Lobb* (K).

ECUADOR.

PICHINCHA: Andes near Quito, *Jameson* 384 (K); *Couthouy* (G, Y); *Hartweg* 1218* (K, type).

This species is closely allied to the preceding, from which it is marked by the reddish puberulence of flowers and leaves.

3. *Macleania floribunda* Hook. Icon. Pl. 2: pl. 109. 1837.

Low shrub; branchlets terete, clothed with deciduous cinereous glabrous bark; petioles rugose, 3 to 5 mm. long, glabrous; leaf blades ovate, 4 to 6 cm. long, 2 to 3 cm. broad, cuneate or subattenuate at base, acute or short acuminate at apex, entire and narrowly revolute at margins, essentially glabrous on both surfaces, 5-pli-nerved, the secondary nerves oriented above base, arcuate-ascending, with the midnerve impressed above, prominent beneath, the veinlets obscure; inflorescence axillary, the flowers solitary or in small fascicles; pedicels rugose, 6 to 7 mm. long, circumscribed at base by several oblong bractlets 2 to 4 mm. long; calyx tube obprismatic, pilose with minute brownish hairs,

about 5 mm. long and 3.5 mm. in diameter, narrowly winged to sinuses, the wings about 0.8 mm. broad; limb about 3.5 mm. long including lobes, the lobes 5, apiculate, about 1 mm. long and 3 mm. across; corolla subcylindric, deciduously pilose without as calyx, laxly white-pilose within distally, 20 to 22 mm. long, about 5 mm. in diameter, the lobes about 2.5 mm. long; stamens 10, 9.5 to 10 mm. long; filaments castaneous, submembranous, firmly connate in a tube, glabrous, about 4 mm. long; anther sacs 4 to 4.5 mm. long; tubule single, submembranous, 2 to 2.5 mm. long, opening by a wide introrse cleft nearly as long; stigma truncate.

TYPE LOCALITY: Jambrasbamba, Department of Amazonas, Peru. Type collected by Mathews (no. 1442).

DISTRIBUTION: Known only from the type collection.

PERU.

AMAZONAS: Jambrasbamba, *Mathews* 1442 (K, type).

This is the type species of the genus. The name *M. floribunda* has from time to time been placed on other specimens in herbaria, but I have seen no other material which is conspecific with the type.

4. *Macleania antioquiae* Fedtsch. & Basil. Not. Syst. Herb. Hort. Bot. U. S. S. R. 6: 23. 1926.

Epiphytic shrub; branchlets terete, subglabrous; petioles stout (about 1.3 mm. in diameter), 2 mm. long, subglabrous, winged nearly to base; leaf blades coriaceous, ovate or ovate-lanceolate, 3 to 5 cm. long, 1 to 2 cm. broad, attenuate at base, acute or obtuse at apex, entire and slightly recurved at margins, glabrous above, glabrous or sparsely pilose beneath (hairs brown, appressed, about 0.2 mm. long), pinnate-veined, the midvein impressed above, prominent beneath, the secondary veins 2 or 3 to a side, usually oriented near base, arcuate-ascending, plane or slightly impressed above, slightly raised beneath, the veinlets reticulate, obscure; inflorescence axillary near ends of branchlets, the flowers solitary or in pairs, glabrous or sparsely pubescent with appressed scattered pale brown hairs about 0.2 mm. long; pedicels rugose, slender, 4 to 8 mm. long, circumscribed at base by several imbricate ovate bractlets about 1.5 mm. long, bibracteolate near base, obscurely articulate with calyx; calyx tube obpyramidal, about 3 mm. long and 2 mm. in diameter at summit at anthesis, winged to sinuses (wings fleshy, about 0.3 mm. broad); limb erect, 2.5 mm. long, the lobes 5, apiculate, 2 mm. broad; corolla cylindric, 15 to 20 mm. long, 3 to 4 mm. in diameter, contracted at throat, the lobes 1 to 2 mm. long; stamens 10, 9 to 10 mm. long; filaments glabrous, connate in a tube, about 4.5 mm. long; anther sacs 4 mm. long; tubule single, rigid, conical, 2.5 to 3 mm. long, opening by a wide introrse distal cleft 1.5 to 2 mm. long; stigma truncate.

TYPE LOCALITY: Department of Antioquia, Colombia. Type collection not cited.

DISTRIBUTION: Andes of Colombia and Ecuador, altitude 1,500 to 3,700 meters. COLOMBIA.

EL VALLE: Cuesta de Tocotá, Western Cordillera, *Pittier* 770 (N, Y).

ECUADOR: "Andes," *Pearce* (K).

The type of this species is not available to me. From the description it appears to be more generally pilose than the specimens cited, which nevertheless agree well in all other points.

5. *Macleania stricta* A. C. Smith, sp. nov.

Frutex glaber; laminis ovatis basi cuneatis apice subacutis 5 ad 7 pli-nerviis; inflorescentia subfasciculata; calyce 5-alato, lobis breviter triangularibus;

corolla angulata; staminibus aequalibus, filamentis basi laxè connatis, tubulo unico quam loculis breviorè.

Shrub; branchlets terete, glabrous, with a loose nigrescent bark; petioles nigrescent, subterete, glabrous, 3 to 4 mm. long, narrowly winged above; leaf blades coriaceous, ovate, 4 to 8 cm. long, 2.5 to 4.5 cm. broad, cuneate or subattenuate at base, bluntly acute at apex, entire and slightly recurved at margins, glabrous, 5 to 7 pli-nerved, the secondary nerves oriented near base, arcuate, with the midnerve impressed above, prominent beneath, the veinlets reticulate, plane on both surfaces; inflorescence axillary, subfasciculate (rachis stout, not exceeding 5 mm. in length), 4 to 15 flowered; pedicels striate, 5 to 9 mm. long, slender, each subtended by an ovate acute bractlet less than 1 mm. long, bibracteolate near middle; calyx tube obprismatic, about 2 mm. long and 2 mm. in diameter at anthesis, narrowly winged to sinuses; limb about 1 mm. long including lobes, the lobes 5, acute, less than 1 mm. long; corolla subcylindric, 5-angled to lobes, about 14 mm. long and 3 mm. in diameter, glabrous without, sparsely white-tomentose distally within, the lobes triangular, acute, about 1 mm. long; stamens 10, equal, about 7 mm. long; filaments membranous, glabrous, loosely connate at base, 2.5 mm. long; anther sacs 3 mm. long; tubule single, membranous, elongate-conical, about 2 mm. long, opening by a wide introrse distal cleft about 1.2 mm. long; style filiform, slightly exserted, the stigma truncate.

Type in the U. S. National Herbarium, no. 1,420,322, collected between Ricaurte and Pipulquer, Tuquerres, Department of Nariño, Colombia, altitude 1,200 to 1,600 meters, July or August, by F. C. Lehmann (no. 5437). Duplicates at B, F, G, K, Y.

DISTRIBUTION: Andes of southern Colombia.

COLOMBIA.

NARIÑO: Pasto, Lobb 81 (K). San Pablo, "Piedra ancha," André 3297 (K).

This is a species of the alliance of *M. floribunda*, most closely related to *M. angulata*, from which it differs by having the corollas shorter and the inflorescences with more numerous flowers.

6. *Macleania angulata* Hook. Bot. Mag. Curtis 69: pl. 3979. 1843.

Shrub; branches and branchlets terete, glabrous; petioles subterete, glabrous, short; leaf blades coriaceous, ovate, 5 to 8 cm. long, 3 to 4 cm. broad, rounded or narrowed at base, obtuse at apex, entire at margins, 5-pli-nerved from near base, the midnerve pinnate above; flowers axillary, fasciculate (usually in groups of 3); pedicels 20 to 25 mm. long, bibracteolate near base, swollen above; calyx tube obprismatic, narrowly winged to sinuses; limb very short, the lobes 5, apiculate; corolla subcylindric, 5-angled, about 20 mm. long or more, glabrous; stamens 10; filaments thin-carnose, united in a tube; anthers erect, the tubule single, opening by a wide introrse cleft about half as long; style nearly as long as corolla, the stigma capitate.

TYPE LOCALITY: Peru. Type a cultivated plant raised from seed collected by Maclean.

I have not seen specimens referable to this species, but from the plate and description given by its author its taxonomic position as an ally of *M. floribunda* seems definite. The above incomplete description is drawn up from the original one.

7. *Macleania pentaptera* Hoer. Bot. Jahrb. Engler 42: 299. 1909.

Climbing or epiphytic shrub; branches and branchlets terete, glabrous (young parts sometimes sparsely puberulous), brownish; petioles thick, about 3 mm. long, glabrous, rugose; leaf blades coriaceous, ovate, 8 to 12 cm. long, 4 to 7 cm.

broad, glabrous, strongly cordate at base, sometimes amplexicaul, rounded or subacute at apex, entire, plane or slightly revolute at margins, pinnate-veined, the secondary veins 3 or 4 to a side, arcuate-ascending, usually oriented near base, with the midvein slightly impressed above, prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces; inflorescence axillary, short-racemose, 3 to 8 flowered; rachis up to 4 cm. long; pedicels 12 to 18 mm. long, rugose, glabrous or minutely puberulous, deciduously bibracteolate near middle (bractlets ovate, less than 1 mm. long), swollen distally and obscurely articulate with calyx; calyx obconical, glabrous or minutely puberulous distally, 10 to 13 mm. long, about 6 mm. in diameter at base of lobes, narrowly 5-winged to sinuses (wings fleshy, about 0.5 mm. broad, each continuing beyond margin of calyx to form a coriaceous spur), the limb dilated, minutely 5-lobed, the lobes apiculate, often suppressed; corolla scarlet, green distally, coriaceous, cylindric, 13 to 20 mm. long, about 5 mm. in diameter, slightly contracted at throat, glabrous without, densely tomentose within towards apex with pale tangled hairs up to 0.5 mm. long, the lobes erecto-patent, elongate-triangular, acute, about 3 mm. long and 1.5 mm. broad at base, frequently each with a perpendicular fleshy oblong apiculate spur; stamens 10, nearly as long as corolla; filaments glabrous, connate in a tube, about 3 mm. long; anther sacs 5 to 7.5 mm. long; tubule single, elongate-conical, 3 to 5.5 mm. long, opening by a wide introrse cleft about half as long; style often slightly exerted, the stigma truncate.

TYPE LOCALITY: Slopes of Mount Corazón, near Milligolly, Province of Pichincha, Ecuador. Type collected by Sodiro (no. 92/2).

DISTRIBUTION: Western Cordillera of Colombia and northern Ecuador.

COLOMBIA: Along Pacific coast, *Seemann* 1079 (K).

EL VALLE: Buenaventura and vicinity, near sea level, *Killip* 5329 (B, N, Y); *Triana* 2712 (K, Y), 2713 (K); *Pittier* 588 (N).

ECUADOR: *Seemann* (G, K).

PICHINCHA: Slopes of Mount Corazón, near Milligolly, *Sodiro* 92/2 (B, type).

With the exception of the type, all the above-cited specimens are described as growing in mangrove swamps at sea level, a habitat unique among *Thibaudieae*. The calyces have wings so strongly developed that the actual lobes are quite obscured, a condition suggested by *M. cordifolia*, etc., but never approached except in the present species. The presence of spurs on the corolla lobes is a more variable character; the type specimen has them very obscure, but in the material from the Dagua Valley of Colombia they are prominent. In leaf characters the above-cited specimens are fairly constant; the greatest variation is found in the *Seemann* specimen from Colombia, which has the leaves decidedly narrowed.

8. *Macleania rotundifolia* Sod. & Hoer. Bot. Jahrb. Engler 42: 300. 1909.

Shrub; branchlets terete, violaceous, minutely pale-puberulous or glabrous; petioles subrugose, essentially glabrous, 1 to 2 mm. long, stout; leaf blades broadly ovate or suborbicular, 7 to 10 cm. long, 5 to 8 cm. broad, cordate and subamplexicaul at base, rounded or obtuse at apex, entire at margins, glabrous, subcoriaceous, 7 to 9 pinnately-nerved, the lower pairs of secondary nerves spreading, the upper pair ascending, with the midnerve slightly impressed or plane above, raised beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary, short-racemose, minutely pale-puberulous or glabrous on all external surfaces, 6 to 8 flowered; rachis striate, about 2 cm. long; pedicels rugose, 8 to 12 mm. long, each subtended by an oblong bractlet about 2 mm.

long; calyx tube obprismatic, about 4 mm. long and 4 mm. in diameter at anthesis, 5-angled or narrowly winged to sinuses; limb 2 to 3 mm. long including lobes, the lobes 5, minutely apiculate, about 3 mm. broad; corolla subcylindric, 20 to 22 mm. long, 5 to 6 mm. in diameter, white-tomentose within distally, the lobes about 2 mm. long; stamens 10, equal, 9.5 to 10 mm. long; filaments submembranous, firmly connate in a tube, 4 mm. long; anther sacs 3.5 to 4 mm. long; tubule single, submembranous, 2.5 to 3 mm. long, opening by a wide introrse pore about half as long; style as long as corolla, the stigma truncate.

TYPE LOCALITY: Near Ito-Muby, Ecuador. Type collected by Sodiro (no. 92/1).

DISTRIBUTION: Known only from the type collection.

ECUADOR: Near Ito-Muby, Sodiro 92/1 (B, type).

9. *Macleania amplexicaulis* A. C. Smith, sp. nov.

Frutex subglaber; laminis late ovatis breviter petiolatis basi cordatis amplexicaulibusque apice rotundatis; inflorescentia subfasciculata; calyce 5-alato, lobis elongato-triangularibus; corolla subcylindrica intus superne tomentosa; staminibus aequalibus, filamentis glabris basi connatis, tubulo unico quam loculis paullo brevior.

Shrub; branchlets subterete, with a loose brownish puberulous bark; petioles very short (less than 1 mm. long, the leaves practically sessile); leaf blades broadly ovate, strongly amplexicaul, 5 to 9 cm. long, 4 to 8 cm. broad, strongly cordate and overlapping at base, rounded at apex, entire or faintly crenulate at margins, glabrous, 7 to 13 nerved, the first 2 or 3 pairs oriented from the midnerve near its base, the remaining secondary nerves spreading from the base, with the midnerve plane above, prominent beneath, the veinlets reticulate, plane on both surfaces; inflorescence axillary, subfasciculate, 2 to 5 flowered, bracteate at base with a few subpuberulous ovate bracts up to 2 mm. long; pedicels striate, 6 to 8 mm. long, glabrous; calyx tube about 2.5 mm. long and 2.5 mm. in diameter at anthesis, narrowly 5-winged to sinuses; limb spreading, about 2.5 mm. long including lobes, the lobes 5, elongate-deltoid, about 2 mm. long; corolla subcylindric, about 18 mm. long and 4 mm. in diameter, contracted above, glabrous without, densely white-tomentose distally within, 5-lobed, the lobes elongate-deltoid, about 2 mm. long; stamens 10, equal, 11 to 12 mm. long; filaments membranous, glabrous, connate in basal half, about 2.5 mm. long; anther sacs about 5 mm. long, incurved at base; tubule single, membranous, elongate-conical, about 4.5 mm. long, opening by a wide introrse distal cleft about 2 mm. long; style filiform, about as long as corolla, the stigma truncate.

Type in the herbarium of the New York Botanical Garden, collected on hillside west of Río San Joaquín, La Galera, Micay Valley, Department of El Cauca, Colombia, altitude 1,200 to 1,400 meters, June 29, 1922, by E. P. Killip (no. 7886). Duplicate in U. S. National Herbarium.

DISTRIBUTION: Known only from the type collection.

This species is closely related to *M. rotundifolia*, from which it differs by having the inflorescence subfasciculate rather than racemose and the calyx lobes longer.

EXPLANATION OF PLATE 8.—*Macleania amplexicaulis*, from photograph of type sheet. About one-half natural size.

10. *Macleania ovata* Klotzsch, *Linnaea* 24:20. 1851.

Shrub, probably epiphytic; branchlets terete, cinereous, glabrous; petioles stout, 1 to 2 mm. long, glabrous; leaf blades thick-coriaceous, oblong or

ovate, 2 to 4.5 cm. long, 1 to 2.5 cm. broad, rounded or subcordate at base, obtuse at apex, entire and slightly revolute at margins, glabrous and sparsely punctate above, glabrous beneath, 5 to 7 pli-nerved, the nerves oriented above base, slightly impressed above, prominent beneath, the veinlets reticulate, obscure; inflorescence axillary, fasciculate, 4 to 7 flowered; pedicels rugose, stout, 4 to 8 mm. long, glabrous, circumscribed at base by several ovate puberulous bractlets 2 to 4 mm. long, bibracteolate near base, obscurely articulate with calyx; calyx tube glabrous, obpyramidal, 3 to 5 mm. long and 3 mm. in diameter at summit at anthesis, winged to sinuses (wings 0.5 mm. broad); limb erect, 2 to 5 mm. long including lobes, the lobes 5, subacuminate, 1.5 to 2 mm. long and 3 mm. across base; corolla orange-red, cylindric, glabrous or slightly pubescent towards apex, 21 to 25 mm. long, 4 mm. in diameter, contracted at the elongate throat, slightly 5-angled (angles terminating in lobes), the lobes spreading, about 2.5 mm. long, white-pubescent within; stamens 10, about 10 mm. long; filaments glabrous, connate in a tube, about 4 mm. long; anther sacs 4 to 4.5 mm. long; tubule single, rigid, conical, 2.5 to 3 mm. long, opening by an introrse elongate cleft 1 to 1.5 mm. long; stigma peltate.

TYPE LOCALITY: Veraguas, Panama. Type collected by Warszewicz.

DISTRIBUTION: Costa Rica and western Panama, altitude 1,400 to 1,500 meters.

COSTA RICA: *Lankester* K79 (K). Pacayas, *Wercklé* 16650 (N).

CARTAGO: El Muñeco, on Río Navarro, *Standley & Torres* 50883 (N).

PANAMA: Veraguas, *Warszewicz* (B, type).

Among the four specimens cited there is considerable variation, and possibly the single feature of the calyx, as described in the key, is not sufficient to give them specific unity. The leaves of the Costa Rican specimens are somewhat larger than those of the type, and of the *Wercklé* specimen more obviously punctate, but in view of the wide leaf variation throughout the genus the similarity in calyces seems a more constant character.

11. *Macleania linearifolia* (Donn. Smith) A. C. Smith.

Macleania cordata Lem. var. *linearifolia* Donn. Smith, Bot. Gaz. 16:12. 1891.

Shrub; branchlets subterete, subglabrous, with a brown deciduous bark; petioles rugose, 3 to 4 mm. long; leaf blades lanceolate-oblong, 8 to 12 cm. long, 1 to 2 cm. broad, rounded at base, acute at apex, entire at margins, glabrous, 5-pli-nerved, the midnerve impressed above, prominent beneath, the secondary nerves oriented near base, ascending near margins, slightly raised on both surfaces, the veinlets copiously reticulate, raised on both surfaces; flowers axillary, solitary or in pairs, glabrous; pedicels rugose, 8 to 10 mm. long, bibracteolate near base with ovate acute fimbriate bractlets about 1.5 mm. long; calyx tube obprismatic, about 4 mm. long and 4 mm. in diameter at anthesis, winged to sinuses; limb about 2.5 mm. long including lobes, the lobes 5, apiculate, about 0.5 mm. long; corolla cylindric-urceolate, about 22 mm. long, 4 to 5 mm. in diameter, contracted at throat, white-tomentose distally within, the lobes acute, about 1.5 mm. long; stamens 10, 8 to 9 mm. long; filaments glabrous, connate, about 3 mm. long; anther sacs 4 to 4.5 mm. long; tubule single, cylindric-conical, about 2.5 mm. long, opening by a wide introrse cleft about half its length; style about 25 mm. long, the stigma peltate.

TYPE LOCALITY: Pansamalá, Department of Alta Verapaz, Guatemala, altitude about 1,200 meters. Type collected by von Tuerckheim (no. 1332).

DISTRIBUTION: Known only from the type collection.

GUATEMALA.

ALTA VERAPAZ: Pansamalá, von Tuerckheim 1332 (N, type).

The narrowly linear leaves of this plant seem to mark it specifically from *M. insignis*, in view of the fact that there are apparently no intergrading forms.

12. *Macleania compacta* A. C. Smith, sp. nov.

Frutex compactus glaber; laminis ovatis breviter petiolatis basi subcordatis apice obtusis 5-pli-nerviis; inflorescentia fasciculata pauciflora; pedicellis brevibus; calyce anguste 5-alato, lobis apiculatis; corolla cylindrica; staminibus aequalibus, filamentis connatis, tubulo unico quam loculis paullo brevior.

Shrub; branchlets terete, glabrous; petioles terete, stout (about 1.5 mm. in diameter), 2 mm. long, glabrous; leaf blades thick-coriaceous, ovate, 3 to 4 cm. long, 2 to 3 cm. broad, cordate or subcordate at base, rounded or obtuse at apex, entire, thickened, and slightly revolute at margins, glabrous, 5-pli-nerved, the nerves oriented above base, plane or slightly raised above, raised beneath, the veinlets reticulate, raised above, plane beneath; inflorescence axillary near ends of branchlets, fasciculate, 1 to 3 flowered, the flower parts glabrous; pedicels subterete, stout (1.2 mm. in diameter), 3 to 4.5 mm. long, bibracteolate near base (bractlets minute, ovate, 0.7 mm. long), encircled at summit by several deciduous minute cartilaginous teeth about 0.1 mm. long; calyx tube obpyramidal, about 3 mm. long and 3 mm. in diameter at summit at anthesis, winged to sinuses, the wings fleshy, about 0.3 mm. wide; limb suberect, 2 mm. long including lobes, the lobes 5, apiculate, less than 1 mm. long; corolla cylindric, 15 to 16 mm. long, 4 mm. in diameter near base, contracted distally, the lobes about 1.5 mm. long; stamens 10, about 6.5 mm. long; filaments glabrous, connate in a tube, about 2 mm. long; anther sacs 3 mm. long; tubule single, rigid, conical, 2 mm. long, opening by an introrse elongate cleft about half its length; style about as long as corolla.

Type in the Gray Herbarium, collected at Barranca of Texolo, near Jalapa, State of Veracruz, Mexico, altitude about 1,100 meters, May 22, 1899, by C. G. Pringle (no. 7870).

DISTRIBUTION: Known only from the type collection.

This plant seems to merit specific recognition on the strength of the characters pointed out in the key; it differs from *M. insignis* in its small flowers and particularly in its short pedicels, but in leaf character is essentially similar.

13. *Macleania insignis* Mart. & Gal. Bull. Acad. Sci. Brux. 9:531. 1842.

Thibaudia laurifolia Mart. & Gal. Bull. Acad. Sci. Brux. 9:530. 1842.

Macleania cordata Lem. Fl. Serr. Jard. I. 4:312. 1848.

?*Birania tuberosa* Auct.; Walp. Ann. Bot. 1:478. 1849.

Macleania colorata Klotzsch, Linnaea 24:68. 1851.

Macleania tuberosa Niedenzu, Bot. Jahrb. Engler 11:224. 1889, nomen.

Thibaudia tuberosa Leibold; Niedenzu, Bot. Jahrb. Engler 11:224. 1889, as synonym.

Shrub up to 4 meters high; branchlets terete, dark brown, with a deciduous subpuberulous bark; petioles subterete, glabrous, about 2 mm. long; leaf blades ovate, 3 to 8 cm. long, 1.5 to 4 cm. broad, subcordate at base, obtuse or subacute at apex, entire and slightly revolute at margins, glabrous, 5-pli-nerved, the secondary nerves oriented near base, ascending, with the midnerve slightly impressed above, raised beneath, the veinlets reticulate, plane on both surfaces; inflorescence axillary, subfasciculate, 2 or 3 flowered, circumscribed at base by a few minute ovate fimbriate bractlets; pedicels rugose, 8 to 15 mm. long, glabrous, bibracteolate near base with ovate bractlets up to 2 mm. long;

calyx tube glabrous, obprismatic, about 4 mm. long and 4 mm. in diameter at anthesis, winged to sinuses; limb about 2.5 mm. long including lobes, the lobes 5, apiculate, 1.5 mm. long; corolla elongate-urceolate, 20 to 25 mm. long and about 5 mm. in diameter, contracted at throat, glabrous or faintly puberulous without, sparsely tomentose distally within, the lobes acute, about 1.5 mm. long; stamens 10, 9 to 12 mm. long; filaments castaneous, glabrous, firmly connate, 3.5 to 5 mm. long; anther sacs 4 to 5 mm. long; tubule single, cylindric-conical, 2 to 2.5 mm. long, opening by a wide introrse cleft more than half its length; style exerted in mature flowers, the stigma peltate.

TYPE LOCALITY: Mirador, State of Veracruz, Mexico. Type collected by Galeotti (no. 1827, in part).

DISTRIBUTION: Mountains of southern Mexico and Guatemala, altitude 1,000 to 1,800 meters.

MEXICO: *Leibold* 23 (B, type of *M. tuberosa*); *Sartorius* (B); *Schaffner* 538 (B); *Mueller* (Y).

VERACRUZ: Mirador, *Galeotti* 1827 (K, type coll.); *Purpus* 288 (B); *Liebmann* 8643 (Y), 8645 (N). Canton de Córdoba, *Conzatti* 167 (G). Zacuapán, *Purpus* 6313 (F, G, Y). Orizaba, *Botteri* 614 (G).

OAXACA: Llano Verde, *Galeotti* 1827 (B). Chinantla, *Galeotti* 1814 (B, N, type collection of *Thibaudia laurifolia*). "Sierra," *Galeotti* 1840 (N).

GUATEMALA.

ALTA VERAPAZ: Cobán, *von Tuerckheim* II. 1661 (N). Finca Sepacuité, *Cook & Griggs* 435 (N). Samac, *Johnson* 292 (N).

BAJA VERAPAZ: Santa Rosa, *von Tuerckheim* II. 2153 (F, G, N, Y), 1190 (B, G, N). Purulhá, *Popenoe* 927 (N).

This species is the common Central American one in the single-tubuled group of *Macleania*. *M. insignis* and *M. cordata* have long been retained as distinct species, but study of the above series of specimens fails to reveal any constant distinctions. The flowers are identical on all specimens, and the leaf measurements are without value. The fact that the author of *M. cordata* did not mention *M. insignis* in his description, but compared his plant with *M. longiflora* and *M. cordifolia*, indicates that he was unaware of the earlier name. The type of *M. cordata*, which I have not seen, was a cultivated plant introduced into Europe by Ghiesbreght, presumably from Mexico.

14. *Macleania cordifolia* Benth. Pl. Hartw. 223. 1846.

Macleania speciosissima Hook. f. Bot. Mag. Curtis 90: pl. 5453. 1864.

Low shrub; branchlets pale brown, terete, glabrous; petioles rugose, glabrous, 2 to 5 mm. long; leaf blades ovate or ovate-oblong, 4 to 10 cm. long, 2 to 5 cm. broad (rarely larger), subcordate at base, obtuse or subacute at apex, subentire and slightly thickened at margins, glabrous, sparsely punctate above, 5 to 7 pinnately-nerved, the secondary nerves oriented above base, arcuate-ascending, with the midnerve plane above, raised beneath, the veinlets copiously reticulate, slightly raised on both surfaces; inflorescence axillary, short-racemose, 4 to 10 flowered, the rachis rugose, up to 1 cm. long; pedicels rugose, swollen distally, glabrous, 8 to 15 mm. long, each subtended by an ovate acute bractlet up to 2 mm. long, bibracteolate near base; calyx tube obprismatic, glabrous, 3 to 5 mm. long and 4 mm. in diameter at anthesis, broadly winged to sinuses; limb about 2.5 mm. long including lobes, the lobes 5, apiculate, less than 1 mm. long; corolla cylindric, 14 to 25 mm. long, about 4 mm. in diameter, contracted above, glabrous without, densely white-pubescent distally within, the lobes about 2 mm. long; stamens 10, 9 to 11 mm. long; filaments coherent, about 2.5 mm. long, puberulous; anther sacs 3.5 to 6 mm. long; tubule single, broadly

cylindric-conical, 4 to 5 mm. long, opening by a wide introrse cleft about half its length; style about as long as corolla, the stigma truncate.

TYPE LOCALITY: Hacienda de Iraví, near Perucho, Province of Pichincha, Ecuador. Type collected by Hartweg (no. 1218).

DISTRIBUTION: Andes of Ecuador (and Colombia?).

COLOMBIA?: *Linden* (K, type of *M. speciosissima*).

ECUADOR.

PICHINCHA: Hacienda de Iraví, near Perucho, *Hartweg* 1218 (B, K, type).

CHIMBORAZO: Foot of Mount Chimborazo, 900 meters, *Spruce* 6168 (K).

CULTIVATED PLANTS: Origin unknown but possibly from the Hartweg collection (B, G, K, Y).

This species has been cultivated in botanical gardens and in private greenhouses, but I have not been able to ascertain from what collector the original plant was obtained. Like all others of the genus, it makes a very showy plant for cultivation.

15. *Macleania punctata* Hook. Bot. Mag. Curtis 75: pl. 4426. 1849.

Low shrub; branchlets subterete, brownish, sparsely puberulous, becoming glabrous; petioles subrugose, 3 to 4 mm. long, sparsely puberulous or glabrous; leaf blades coriaceous, ovate or ovate-oblong, 5 to 7 cm. long, 2.5 to 4 cm. broad, truncate or lightly subcordate at base, acute or obtuse at apex, entire and slightly recurved at margins, essentially glabrous and sparsely punctate above, deciduously puberulous on nerves beneath, 7-plexi-nerved, the secondary nerves oriented above base, ascending, with the midnerve nearly plane above, raised beneath, the veinlets reticulate, slightly raised or plane on both surfaces; inflorescence axillary, short-racemose, 5 to 10 flowered, pilose on all exterior surfaces with pale spreading hairs about 0.5 mm. long, becoming essentially glabrous; rachis about 5 mm. long; petioles striate, 12 to 20 mm. long, bracteate at base and bibracteolate slightly above middle (bractlets lanceolate-oblong, about 2 mm. long), swollen distally; calyx narrowly winged to sinuses, the tube obprismatic, 6 mm. long and 4 to 5 mm. in diameter at summit at anthesis, the limb 2 to 3 mm. long including lobes, the lobes 5, apiculate, about 4 mm. broad, submembranous at margin; corolla subcylindric, about 22 mm. long, 5 to 6 mm. in diameter, white-tomentose within distally, the lobes about 1.5 mm. long; stamens 10, about 12 mm. long; filaments dark castaneous, 3 to 4 mm. long, connate, glabrous; anther sacs 5 to 6 mm. long; tubule single, 4 mm. long, opening by a wide introrse cleft nearly as long; stigma subpeltate.

TYPE LOCALITY: "Andes of Ecuador." Type a cultivated plant, originally collected by Lobb.

DISTRIBUTION: Andes of northern Ecuador, altitude 2,500 to 3,000 meters.

ECUADOR: *Lobb* (K, type).

PICHINCHA: Western side of Mount Pichincha, *Jameson* S2 (K). Pulu-lagua, *Jameson* (K). Andes of Quito, *Jameson* (K).

This is a species well marked by the pubescence of its inflorescence, but the punctation of the leaves is somewhat obscure and variable, as it is throughout the genus.

15a. *Macleania punctata* Hook. var. *puberula* Danguy & Cherm. Bull. Mus. Hist. Nat. 28: 434. 1922.

TYPE COLLECTION: *Rivet* 520, Danas, Ecuador.

I have not seen the type of this variety, which is mentioned as being more puberulous than the species, with thinner leaves.

16. *Macleania pubiflora* Benth. Pl. Hartw. 224. 1846.

Low shrubs; branchlets stout, terete, densely puberulous with brownish spreading hairs up to 0.2 mm. long; pedicels subterete, 5 to 10 mm. long, puberulous or glabrescent, winged above; leaf blades ovate or slightly obovate, 6 to 8 cm. long, 2 to 3 cm. broad, cuneate or subattenuate at base, obtuse or subacute at apex, entire and slightly thickened at margins, glabrous above, pale puberulous beneath, becoming glabrous, pinnate-veined, the secondary veins 2 or 3 to a side, ascending, oriented from the midvein in the basal half, with the midvein impressed above, prominent beneath, the veinlets obscurely reticulate; inflorescence axillary, subfasciculate, 3 to 5 flowered; pedicels subterete, 6 to 10 mm. long, pale-pubescent (hairs spreading, up to 0.3 mm. long), bibracteolate at middle with acute, partially fused, involucre, pubescent bractlets up to 2 mm. long, swollen distally; calyx tube subcylindric, about 2.5 mm. long and 2 mm. in diameter at anthesis, densely white-pubescent; limb spreading, 3 to 4 mm. long including lobes, the lobes 5, apiculate, about 1 mm. long; corolla cylindric-urceolate, 17 to 18 mm. long, 5 to 6 mm. in diameter at base, about 3 mm. in diameter at throat, pubescent without, especially distally, with pale spreading hairs up to 0.5 mm. long, glabrous within, the lobes acute, about 2 mm. long; stamens 10, about 10 mm. long; filaments nigrescent, glabrous, free, 3 to 4 mm. long; anther sacs incurved at base, 5.5 to 6 mm. long; tubule single, narrowly cylindric-conical, 2.5 mm. long, opening by a short oval introrse cleft, the medial partition sometimes present to tip; stigma truncate.

TYPE LOCALITY: Hacienda de Hato Frío, "Prov. Popayan," Department of El Cauca, Colombia. Type collected by Hartweg (no. 1222).

DISTRIBUTION: Andes of southern Colombia, altitude 2,400 to 3,000 meters. COLOMBIA.

EL CAUCA: Hacienda de Hato Frío, *Hartweg* 1222 (K, type). San José, near San Antonio, *Pennell* 7566 (B, G, N, Y). Páramo de Achupallas, *Triana* 2672 (B, K).

With the following species this forms a distinct group of *Macleania* with pilose flowers, distinct filaments, single tubules, and a tendency toward elongate calyx lobes. The last character is notable, however, only in *M. salapa*.

17. *Macleania salapa* (Benth.) Benth. & Hook. Gen. Pl. 2:566. 1876.

Ceratostema salapa Benth. Pl. Hartw. 141. 1844.

Tyria salapa Klotzsch, *Linnaea* 24:21. 1851.

Shrub; branchlets subterete, slightly puberulous when young, becoming glabrescent and nigrescent; petioles 3 to 4 mm. long, glabrous, narrowly winged; leaf blades obovate, 3 to 4 cm. long, 1.5 to 2 cm. broad, cuneate at base, obtuse or subacute at apex, entire or faintly crenulate and slightly revolute at margins, glabrous, pinnate-veined, the midnerve slightly impressed above, prominent beneath, the secondary veins 2 or 3 to a side, oriented from the midnerve near base, arcuate-ascending, slightly impressed or plane above, slightly elevated beneath, the veinlets obscure; inflorescence axillary toward ends of branchlets, subfasciculate, 2 to 4 flowered, circumscribed at base by a few triangular puberulous bractlets about 2 mm. long; pedicels 3 to 5 mm. long, densely pilose with pale spreading hairs about 0.2 mm. long, bibracteolate toward base with lanceolate-triangular bractlets about 3 mm. long, obscurely articulate with calyx; calyx tube obprismatic, about 2 mm. long and 3 mm. in diameter at summit at anthesis, narrowly 5 or 6 winged to sinuses, pilose as the pedicels; limb about 8 mm. long including lobes, the lobes 6 (frequently 5), lanceolate, acute, 7 mm. long, 2 to 2.5 mm. across base, sparsely white-pilose on both surfaces, ciliate at margins with short stiff brown hairs; corolla

subcylindric, 6 (or 5) angled, about 15 mm. long, 4 mm. in diameter, contracted above, pilose as the pedicels, 6 (or 5) lobed, the lobes spreading, about 1.5 mm. long; stamens 12 (or 10), 7.5 to 9 mm. long; filaments free, 0.5 to 2 mm. long, glabrous, mahogany-colored, narrowed above; anther sacs 3.5 to 4 mm. long, incurved at base; tubules partially united, erect, elongate-conical, about 3 mm. long, opening by distal introrse elongate pores up to 2 mm. long; style about as long as corolla, the stigma peltate.

TYPE LOCALITY: Loja, Province of Loja, Ecuador. Type collected by Hartweg (no. 784).

DISTRIBUTION: Andes of Ecuador, possibly limited to the region around Loja.

ECUADOR: *André* 4340 (K); *Seemann* (K).

LOJA: Loja, *Hartweg* 784 (B, K, type, Y).

18. *Macleania euryphylla* Blake, Journ. Washington Acad. Sci. 14:291. 1924.

Shrub; branchlets stout, cinereous, subterete, pale-pubescent when young with spreading hairs up to 0.4 mm. long; petioles rugose, narrowly winged, puberulous, 5 to 7 mm. long; leaf blades deltoid-ovate, 5 to 7 cm. long, 4 to 5 cm. broad, truncate at base, rounded at apex, entire and slightly revolute at margins, glabrous, obscurely punctate above, pinnate-veined, the secondary veins 3 to a side, oriented near base, spreading, with the midvein plane above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary, subfasciculate, 5 to 20 flowered, circumscribed at base by numerous broadly ovate, fimbriate bractlets up to 4 mm. long; pedicels subterete, glabrous, 6 to 9 mm. long, bibracteolate near base; calyx tube obconical, about 3 mm. long and 3 mm. in diameter at anthesis, glabrous or faintly puberulous; limb 2 to 2.5 mm. long including lobes, the lobes 5, apiculate, about 1 mm. long; corolla cylindric-urceolate, 14 to 15 mm. long and 5 mm. in diameter, contracted at throat, glabrous, the lobes acute, about 1.5 mm. long; stamens 10, about 9 mm. long; filaments free or slightly coherent at base, about 2.5 mm. long, pilose at margins distally with hairs up to 0.5 mm. long; anther sacs 3 to 4 mm. long; tubules laterally connate, cylindric-conical, 3 to 4 mm. long, opening by a more or less fused cleft about half their length; style stout, slightly exserted, the stigma peltate.

TYPE LOCALITY: Cusatagua, near Ambato, Province of Tunguragua, Ecuador. Type collected by Pachano (no. 179).

DISTRIBUTION: Known only from the type collection.

ECUADOR.

TUNGURAGUA: Cusatagua, near Ambato, *Pachano* 179 (N, type).

This species is distinct in its peculiar deltoid leaves, which are broadest very near the base, and is also characterized by short crowded axillary inflorescences. Local name: "Sagalita."

19. *Macleania crassa* A. C. Smith, sp. nov.

Frutex crassus; petiolis rugosis crassis; laminis oblongis basi rotundatis vel cuneatis apice subacutis pinnatinerviis, nervis subtus prominentibus; inflorescentia longe racemosa, rhachidibus crassis; calyce breviter cylindrico, limbo lato 5-lobato; corolla cylindrico-urceolata carnosae-coriaceae 5-lobatae; staminibus aequalibus, filamentis carnosis distinctis glabris, loculis granulatissimis, tubulis lateraliter connatis quam loculis paulo brevioribus.

Stout shrub; branchlets stout, angled, glabrous; petioles rugose, 12 to 20 mm. long, up to 5 mm. in diameter, glabrous, narrowly winged above; leaf blades oblong, 10 to 25 cm. long, 4 to 9 cm. broad, rounded or cuneate at base, acute or obtuse at apex, entire and slightly revolute at margins, glabrous, sparsely punctate above, pinnate-veined, the midvein stout, slightly raised above, very

prominent beneath, the secondary veins 4 or 5 to a side, arcuate-ascending, slightly impressed above, prominent beneath, the veinlets reticulate, plane above, slightly raised beneath; inflorescence terminal or axillary near ends of branchlets, racemose; rachis stout (up to 7 mm. in diameter), subterete, glabrous, 10 to 25 cm. long; pedicels subterete, stout (about 3 mm. in diameter), 12 to 25 mm. long, glabrous, 1 or 2 per centimeter of rachis, sometimes subtended by leaflike bracts up to 8 cm. long, bibracteolate near middle with ovate rounded bractlets up to 4 mm. long, swollen distally; calyx tube short-cylindric, about 4 mm. long and 5 mm. in diameter at anthesis, glabrous; limb spreading, 6 to 7 mm. long including lobes, the lobes 5, ovate, acute, thick-margined except at the apiculate tip, 4 to 5 mm. long (two sometimes partially fused); corolla cylindric-urceolate, 18 to 25 mm. long, 7 to 10 mm. in diameter at base, contracted at throat, thick-carnose, glabrous, 5-lobed, the lobes triangular, acute, 2 to 3 mm. long; stamens 10, equal, 14 to 15 mm. long in mature flowers; filaments nigrescent, thick, free, 2 to 3 mm. long, glabrous; anther sacs strongly granular, stout (up to 2 mm. in diameter), 7 to 9 mm. long; tubules laterally connate, cylindric-conical, 5 to 6.5 mm. long, opening by introrse frequently fused clefts more than half their length; style stout, up to 1 mm. in diameter, shorter than corolla, the stigma truncate.

Type in the U. S. National Herbarium, no. 1,143,639, collected in shrub zone on Mount Santa Ana, Department of El Cauca, Colombia, altitude 2,700 to 3,000 meters, June 29 or 30, 1922, by F. W. Pennell (no. 7465). Duplicates at B, G, Y.

DISTRIBUTION: Andes of southwestern Colombia.

This plant is larger in every respect than other species of *Macleania* known to me, and is unmistakable in aspect. Possibly a plant collected by Lehmann (no. 5962) near Popayán, deposited at Kew, should be included here.

20. *Macleania benthamiana* Walp. Repert. Bot. 6:415. 1847.

Macleania floribunda Benth. Pl. Hartw. 141. 1844, not Hook. 1837.

Macleania popenoei Blake, Proc. Biol. Soc. Washington 35:122. 1922.

Macleania multibracteata Mansf. Notizbl. Bot. Gart. Berlin 9:436. 1925.

Subscandent shrub 3 to 5 meters high; branchlets brownish, glabrous, subterete, stout; petioles rugose, glabrous, 6 to 20 mm. long, winged above; leaf blades oblong or ovate-oblong, 7 to 18 cm. long, 3 to 5 cm. broad, attenuate at base, obtuse or subacute at apex, subentire and revolute at margins, glabrous, dark-punctate above, pinnate-veined, the secondary veins 2 to 4 to a side, oriented near base, ascending, with the midvein slightly impressed above, prominent beneath, the veinlets reticulate, plane on both surfaces; inflorescence axillary, subfasciculate, 8 to 20 flowered, circumscribed at base by numerous imbricate oblong-lanceolate bractlets up to 8 mm. long; pedicels subterete, glabrous, 6 to 10 mm. long, bibracteolate near base with oblong fimbriate bractlets about 3 mm. long, swollen distally; calyx tube obconical, glabrous, about 2.5 mm. long and 3.5 mm. in diameter at summit at anthesis; limb spreading, 2 to 3 mm. long including lobes, the lobes apiculate, about 1.5 mm. long, thin-margined; corolla cylindric-urceolate, 12 to 15 mm. long, 4 to 5 mm. in diameter at base, contracted at throat, glabrous, the lobes about 2 mm. long; stamens 10, 8 to 9 mm. long; filaments nigrescent, free, about 2 mm. long, pilose at margins distally with hairs up to 0.4 mm. long; anther sacs about 4 mm. long; tubules laterally connate, about 4 mm. long, opening by introrse oval clefts about half their length; style slightly exserted, the stigma truncate.

TYPE LOCALITY: Loja, Province of Loja, Ecuador. Type collected by Hartweg (no. 786).

DISTRIBUTION: Andes of southern Ecuador and northern Peru, altitude 2,500 to 2,800 meters.

ECUADOR.

LOJA: Loja, *Hartweg* 786 (K, type). Cordillera de Zamora, east of Loja, *Popenoe* 1330 (N, type of *M. popenoei*).

PERU.

HUÁNUCO: Chaglla, *Macbride* 3664 (F). Between Chaglla and Muña, *Weberbauer* 6704 (B, type of *M. multibracteata*, F).

This species is easily distinguished by the bracts, as mentioned in the key. The Peruvian specimens may have slightly narrower leaves than those from Ecuador, but the difference is barely discernible. The synonymy in this case is a fair example of the necessity of seeing type material, rather than depending upon previous descriptions. A local name (vicinity of Loja) is "joyapa."

21. *Macleania poortmanni* Drake, *Journ. de Bot.* 3:74. 1889.

Small tree up to 6 meters high; branchlets subterete, striate, glabrous or subpuberulous; petioles subterete, rugose, 4 to 6 mm. long, glabrous; leaf blades ovate or subspatulate, 4 to 6 cm. long, 1.8 to 2.5 cm. broad, narrowly attenuate at base, rounded or obtuse at apex, entire or faintly crenulate at margins, glabrous, pinnate-veined, the secondary veins 2 or 3 to a side, arcuate-ascending, with the midvein impressed above, prominent beneath, the veinlets reticulate, obscure; inflorescence axillary, subfasciculate, 2 to 8 flowered; pedicels subterete, stout in fruit, 6 to 8 mm. long, glabrous, bibracteolate at middle with ovate bractlets about 1.5 mm. long; calyx tube campanulate, glabrous, 1.5 to 2 mm. long, 2 mm. in diameter at anthesis; limb 1 to 1.5 mm. long including lobes, the lobes 5, about 0.5 mm. long, 1.5 mm. broad; corolla subcylindric, 7 to 9 mm. long, 2 to 3 mm. in diameter, contracted at throat, glabrous, the lobes less than 1 mm. long; stamens 10, nearly as long as corolla; filaments free, 1 to 1.5 mm. long, nigrescent, sparsely pilose at distal margins; anther sacs about 4 mm. long; tubules laterally connate, about 3 mm. long, opening by wide clefts about 1 mm. long; stigma truncate; fruit ovoid, up to 1 cm. in diameter, the calyx limb persistent.

TYPE LOCALITY: Loja, Province of Loja, Ecuador. Type collected by Poortmann (no. 126).

DISTRIBUTION: Vicinity of Loja, southern Ecuador.

ECUADOR.

LOJA: Vicinity of Loja, *André* 4553 (K); *Popenoe* 1329 (N).

This species is marked by exceptionally attenuate-based leaves, but otherwise is not sharply distinct from the complex referred to *M. nitida*. A local name is "joyapa."

22. *Macleania pilgeriana* Hoer. *Bot. Jahrb. Engler* 42:301. 1909.

Low compact shrub; branchlets subterete, rugose, glabrous, pale brown; petioles subrugose, narrowly winged, glabrous, 3 to 4 mm. long; leaf blades oblong, 4 to 5 cm. long, 1.5 to 2 cm. broad, rounded at base, often decurrent on petiole, entire and slightly revolute at margins, coriaceous, glabrous, pinnate-veined, the midvein nearly plane above, prominent beneath, the secondary veins usually 3 to a side, oriented in basal half of leaf, ascending, slightly raised on both surfaces, the veinlets reticulate, slightly raised or plane; inflorescence axillary or subterminal, short-racemose (rachis up to 8 mm. long), 6 to 10 flowered, glabrous in all parts; pedicels rugose, 10 to 13 mm. long, each subtended by a coriaceous oblong subacute bract 2 mm. long, minutely bibracteolate near base; calyx tube rugose, short-cylindric or campanulate, about 2.5 mm. long, 2 to 3 mm. in diameter at anthesis; limb about 2 mm. long including

lobes, the lobes 5, apiculate, 2.5 to 3 mm. broad, the sinuses acute; corolla subcylindric, about 15 mm. long and 4 mm. in diameter, contracted distally, the lobes about 1 mm. long; stamens 10, about 11 mm. long; filaments castaneous, distinct, sparsely pilose at distal margins; anther sacs 3.5 to 4 mm. long; tubules laterally connate, about 6 mm. long, opening by broad clefts nearly as long; stigma truncate or subpeltate.

TYPE LOCALITY: West of Mount Pichincha, Province of Pichincha, Ecuador. Type collected by Sodiro (no. 92/11b).

DISTRIBUTION: Known only from the type collection.

ECUADOR.

PICHINCHA: West of Mount Pichincha, near Alaspongo and Chiquilpa, Sodiro 92/11b (B, type).

This species is distinguished by the slender elongate tubules, as noted in the key, but is distinct from *M. nitida* on no other tangible character.

23. *Macleania nitida* (H. B. K.) Hoer. Bot. Jahrb. Engler 42: 269. 1909.

Thibaudia rupestris H. B. K. Nov. Gen. & Sp. 3: 270. 1818.

Thibaudia nitida H. B. K. Nov. Gen. & Sp. 3: 271. 1818.

Psammisia nitida Klotzsch, Linnaea 24: 45. 1851.

Psammisia rupestris Klotzsch, Linnaea 24: 45. 1851.

Psammisia alpicola Klotzsch, Linnaea 24: 45. 1851.

Macleania alpicola Hoer. Bot. Jahrb. Engler 42: 269. 1909.

Macleania sodiroi Hoer. Bot. Jahrb. Engler 42: 302. 1909.

Macleania trianae Hoer. Bot. Jahrb. Engler 42: 303. 1909.

Shrub or low tree, the branchlets subterete, brownish or cinereous, puberulous when young, becoming glabrous; petioles subterete, rugose, 3 to 10 mm. long, glabrous, narrowly winged above; leaf blades oblong or ovate-oblong or ovate, 4 to 12 cm. long, 1.5 to 6 cm. broad, cuneate or rounded at base, subacute or obtuse at apex, entire and slightly revolute at margins, glabrous and sometimes very sparsely punctate above, when young frequently pilose beneath with hairs up to 0.3 mm. long, becoming glabrous, pinnate-veined, the secondary veins 3 or 4 to a side, arcuate-ascending, with the midvein slightly impressed above, prominent beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence axillary near ends of branchlets, short-racemose, essentially glabrous in all parts, 4 to 15 flowered, the rachis rugose, 1 to 6 cm. long; pedicels striate, 7 to 20 mm. long, each subtended by an oblong bractlet about 3 mm. long, minutely bibracteolate near base, swollen distally; calyx tube short-cylindric, about 3 mm. long and 3 mm. in diameter at anthesis; limb 3 to 4 mm. long including lobes, the lobes 5, apiculate, 1 to 2 mm. long; corolla cylindric-urceolate, 12 to 22 mm. long, about 6 mm. in diameter at base, contracted at throat, the lobes erect, 1.5 to 2 mm. long; stamens 10, 9 to 13 mm. long; filaments distinct, nigrescent, subglabrous, 2 to 4 mm. long; anther sacs 4.5 to 7 mm. long; tubules laterally connate, cylindric-conical, 4 to 6 mm. long, opening by introrse oval clefts about half their length; style stout, exerted in mature flowers, the stigma peltate.

TYPE LOCALITY: Between Quebrada de Tohecito and La Ceja, in Quindío Andes, Department of Tolima, Colombia. Type collected by Humboldt and Bonpland.

DISTRIBUTION: Andes of Venezuela to northern Peru, common in the northern part of its range, altitude 1,500 to 4,100 meters.

VENEZUELA: *Moritz* 1349 (B, type of *M. alpicola*).

MÉRIDA: Mucurubá, *Gehriger* 324 (N, Y).

COLOMBIA: *Humboldt & Bonpland* (B); *Triana* 4333 (B).

NORTE DE SANTANDER: Mustiscua, Pamplona, etc., *Killip & Smith* 19631 (N, Y), 19738 (N, Y), 19914 (N, Y).

SANTANDER: Various páramo regions, *Killip & Smith* 15722 (N, Y), 15806 (N, Y), 17280 (N, Y), 17281 (N, Y), 17336 (N, Y), 17586 (N, Y), 17698 (N, Y), 17744 (N), 17994 (N, Y), 18222 (N), 18606 (N, Y), 21172 (N).

CUNDINAMARCA: Vicinity of Bogotá, *Triana* 36 (B, type of *M. trianae*), 2703 (K); *Holton* in 1852 (K, Y); *André* 754 (K); *Stuebel* 150b (B); *Schultze* 54 (B, N); *Perez* 1060 (N).

ANTIOQUÍA: Medellín, *Archer* 1211 (N).

CALDAS: Old Quindío Trail, *Killip & Hazen* 9467 (Y).

TOLIMA: Quindío Andes, between Quebrada de Tohecito and La Ceja, *Humboldt & Bonpland* (B, type). Near Páramo de Ruiz, *Pennell* 3116 (N, Y).

COLOMBIA OR ECUADOR: *André* (K). "Piedra ancha," *André* 3344 (K); *André* (K).

ECUADOR: *Jameson* (N).

PICHINCHA: Mount Pichincha, *Sodirol* 92/11 (B, type of *M. sodirol*).

TUNGURAGUA: Baños, *Spruce* 4999 (K, Y).

AZUAY: Nabón, *Rose* 23914 (N). Between Oña and Cuenca, *Hitchcock* 21623 (N, Y).

LOJA: Vicinity of Loja, *Humboldt & Bonpland* (B, type of *Thibaudia rupestris*); *Jameson* in September, 1864 (K).

PERU.

PIURA: Palamba, *Weberbauer* 6041 (B).

CAJAMARCA: Huambos, *Weberbauer* 4182 (B).

In flower structure, length of rachis, pedicels, etc., there are no consequential differences among these specimens. In leaf shape there are slight variations, but certainly none of specific value. In general it may be said that the leaves of the type of *M. nitida* are broadly ovate and obtuse at apex; of the type of *M. alpicola* oblong and somewhat attenuate at base; of the type of *Thibaudia rupestris* lanceolate-oblong; of the type of *M. trianae* elliptic and slightly larger; of the type of *M. sodirol* broadly ovate with deeply impressed nerves. Because these variations occur throughout the above-cited specimens sporadically and without geographic relationship, I do not hesitate to consider the specimens representative of a single species. Local names: "Uva camarona," "cacaguito." The fruit is sometimes eaten.

24. *Macleania glabra* (Klotzsch) Hoer. Bot. Jahrb. Engler 42:268. 1909.

Psammisia glabra Klotzsch, Linnaea 24:46. 1851.

Psammisia costaricensis Klotzsch, Linnaea 24:47. 1851.

Macleania turrialbana Donn. Smith, Bot. Gaz. 27:339. 1899.

Macleania costaricensis Hoer. Bot. Jahrb. Engler 42:268. 1909.

Macleania irazuensis Blake, Proc. Biol. Soc. Washington 35:121. 1922.

Low shrub, usually epiphytic, the branchlets subterete, glabrous; petioles rugose, 4 to 10 mm. long, glabrous, narrowly winged above; leaf blades oblong or ovate-oblong, 4 to 10 cm. long, 2 to 5 cm. broad, cuneate or rounded at base, obtuse or subacute at apex, subentire and slightly revolute at margins, glabrous, sparsely punctate above or smooth, pinnate-veined, the midvein slightly impressed above, prominent beneath, the secondary veins 2 to 4 to

a side, arcuate-ascending, plane above, prominent beneath, the veinlets reticulate, plane above, slightly raised beneath; inflorescence axillary near ends of branchlets, racemose, 4 to 20 flowered, essentially glabrous throughout, the rachis striate, 1 to 8 cm. long; pedicels striate, 10 to 20 mm. long, each subtended by an ovate, slightly fimbriate bractlet up to 3 mm. long, bibracteolate near the base with ovate, sometimes fused bractlets about 3 mm. long, swollen distally; calyx tube short-cylindric, about 2.5 mm. long and 4 mm. in diameter at anthesis; limb subspreading, about 2 mm. long including lobes, the lobes 5, apiculate, about 1 mm. long; corolla cylindric-urceolate, about 20 mm. long and 6 mm. in diameter, contracted at throat to 3 mm. in diameter, the lobes deltoid, about 2 mm. long; stamens 10, 9 to 14 mm. long; filaments free, short-pilose at margins distally; anther sacs incurved at base and apex, 4 to 6 mm. long; tubules laterally connate or distinct nearly to base, rigidly and narrowly cylindric-conical, 4 to 6 mm. long, opening by elongate introrse clefts about half their length; stigma truncate.

TYPE LOCALITY: Mount Veragua, Veraguas, Panama. Type collected by Warszewicz.

DISTRIBUTION: Mountains of Costa Rica and western Panama, altitude 1,500 to 3,300 meters.

COSTA RICA.

SAN JOSÉ: La Palma, *Wercklé* 16588 (B). Cerro de las Vueltas, *Standley & Valerio* 43720 (N), 43907 (N), 44005 (N), 44022 (N). Vicinity of Santa María de Dota, *Standley* 42325 (N), 43048 (N). Vicinity of El Copey, *Standley* 42657 (N), 42683 (N), 42722 (N); *Tonduz* 12251 (N).

CARTAGO: Mount Irazú and vicinity, *Oersted* 8574 (N); *Kuntze* 2346 (Y); *Hoffmann* 555 (B); *Pittier* 13047 (N); *Popenoe* 1017 (N, type of *M. irazuensis*); *Stork* 2070 (F). Cartago, *Oersted* 8648 (N). Volcán de Poás, *Pittier* 2033 (N). Cerro de La Carpintera, *Standley* 34325 (N). Mount Turrialba, *Pittier* 7546 (13090 herb. nat. Cost.) (B, F, G, N, type of *M. turrialbana*, Y); *Standley* 34975a (N), 35257 (N).

PANAMA.

CHIRIQUÍ: Chiriquí Volcano, *Pittier* 3102 (N).

VERAGUAS: *Warszewicz* (B, type of *M. costaricensis*); Mount Veragua, *Warszewicz* (B, type).

The situation with respect to the group of names here listed parallels that concerning *M. nitida*, etc. The type of *M. glabra* has leaves somewhat narrower than the average; the other three types involved are practically identical in leaf shape. As mentioned by Blake under his description of *M. irazuensis*, there is some variation in length of tubules, but this is not sufficiently constant to be of consequence. A good deal of confusion in this group has been caused by a misunderstanding as to whether one or two tubules were present, a situation easily avoided by dissection. A comparison of this species with the South American *M. nitida* shows only the slight distinction mentioned in the key, and perhaps they should be combined. Local names: "Colmillo," "muelas."

25. *Macleania robusta* Rusby, Descr. S. Amer. Pl. 75. 1920.

Macleania arcuata Rusby, Descr. S. Amer. Pl. 76. 1920.

Shrub or low tree 2 to 4 meters high; branchlets terete, brownish, glabrous, straight; petioles rugose, 6 to 10 mm. long, glabrous or faintly puberulous, narrowly winged above; leaf blades ovate or ovate-oblong, 5 to 13 cm. long, 3 to 7 cm. broad, rounded or subcuneate at base, obtuse or subacute at apex, entire and slightly revolute at margins, glabrous, pinnate-veined, the secondary

veins 3 or 4 to a side, arcuate-ascending, with the midvein plane or slightly impressed above, prominent beneath, the veinlets obscurely reticulate; inflorescence axillary near ends of branchlets, racemose, 5 to 10 flowered, glabrous throughout; rachis subterete, rugose, 1.5 to 4 cm. long; pedicels subterete, 13 to 25 mm. long, each subtended by an oblong deciduous bractlet about 4 mm. long, bibracteolate near base with acute bractlets about 3 mm. long, swollen distally; calyx tube short-cylindric, about 2.5 mm. long and 4 mm. in diameter at anthesis; limb 2 to 2.5 mm. long including lobes, the lobes 5, apiculate, about 1 mm. long; corolla cylindric, 14 to 15 mm. long and about 6 mm. in diameter, contracted above, the lobes acute, 1.5 mm. long, faintly pilose within; stamens 10, 8 to 9 mm. long; filaments castaneous, distinct, about 2 mm. long, glabrous; anther sacs about 4 mm. long; tubules laterally connate, cylindric-conical, about 3 mm. long, opening by introrse clefts about half their length; style stout, slightly exserted, the stigma peltate; calyx tube becoming elongate-ovoid in fruit.

TYPE LOCALITY: Sierra del Líbano, Santa Marta, Department of Magdalena, Colombia, altitude 1,800 to 2,200 meters. Type collected by H. H. Smith (no. 1722).

DISTRIBUTION: Known only from the type locality.

COLOMBIA.

MAGDALENA: Sierra del Líbano, Santa Marta, *H. H. Smith* 1722 (N, Y, type), 2789 (N, Y, type of *M. arcuata*).

This species is very close to *M. nitida*, but seems to be specifically distinct on the basis of its robust habit and comparatively wide-spreading inflorescence.

26. *Macleania attenuata* Fedtsch. & Basil. Not. Syst. Herb. Hort. Bot. U. S. S. R. 6:23. 1926.

Compact shrub, the branchlets subterete, rugose, cinereous, glabrous; petioles rugose, glabrous, 2 to 4 mm. long; leaf blades oblong, 5 to 9 cm. long, 2.5 to 3.5 cm. broad, rounded at base, frequently decurrent on petiole, acute, subacute, or obtuse at apex, minutely crenate-undulate at margins, glabrous, sparsely impressed-punctate above, pinnate-veined, the secondary veins 3 to 5 to a side, spreading, ascending near margins, with the midnerve slightly impressed above, raised beneath, the veinlets obscurely reticulate; inflorescence axillary, subfasciculate (peduncle stout, up to 5 mm. long), 5 to 12 flowered, glabrous in all parts; pedicels rugose, stout, 5 to 8 mm. long, each subtended by a small oblong bract, bibracteolate near base (bracts and bractlets ovate-acute, about 2 mm. long); calyx tube rugose, short-cylindric, about 3.5 mm. long and 3 mm. in diameter at anthesis; limb 3 mm. long including lobes, the lobes 5, apiculate, about 3 mm. broad; corolla thin-carnose, cylindric-urceolate, 16 to 17 mm. long, about 5 mm. in diameter, the lobes oblong, subacute, 2 mm. long; stamens 10, about 13 mm. long; filaments dark castaneous, distinct, 3 mm. long, sparsely pilose at distal margins; anther sacs about 4 mm. long; tubules slender, laterally connate, about 8 mm. long, opening by more or less fused clefts more than half as long; style often exserted, the stigma truncate.

TYPE LOCALITY: Western side of Mount Pichincha, Province of Pichincha, Ecuador. Type collected by Jameson (no. 622).

DISTRIBUTION: Known only from the type locality.

ECUADOR.

PICHINCHA: Mount Pichincha, *Jameson* (K, type coll.), 731 (K).

Distinct in the extraordinarily long tubules of its anthers. The leaves of our specimens are not precisely as described by the authors, but I feel certain that the material is placed correctly here.

27. *Macleania nervosa* A. C. Smith, sp. nov.

Frutex; laminis ovato-oblongis basi rotundatis apice obtusis 5 ad 7 pli-nerviis, venulis prominentibus; inflorescentia subfasciculata pauciflora; calyce breviter cylindrico, lobis apiculatis; corolla cylindrica tenuiter carnosae subglabra; staminibus aequalibus, filamentis distinctis ad margines pilosis, tubulis lateraliter connatis loculos subaequantibus.

Shrub; branchlets subterete, when young purplish and puberulous, becoming cinereous and glabrous; petioles rugose, 3 to 7 mm. long, glabrous, narrowly winged above; leaf blades ovate-oblong, 8 to 16 cm. long, 3 to 7 cm. broad, rounded or subcordate at base, obtuse at apex, entire and revolute at margins, glabrous, 5 to 7 pli-nerved, the secondary nerves oriented near base, ascending, with the midnerve slightly impressed above, prominent beneath, the veinlets copiously reticulate, slightly raised above, prominent beneath, white-pilose beneath when young, becoming glabrous; inflorescence axillary, subfasciculate, 2 to 6 flowered; pedicels subterete, 7 to 10 mm. long, puberulous or glabrous, each subtended by a deciduous bractlet about 2 mm. long, bibracteolate near base with minute subpubescent bractlets, swollen distally; calyx tube short-cylindric, sparsely pilose with spreading hairs up to 0.3 mm. long, about 4 mm. long and 4 mm. in diameter at anthesis; limb suberect, about 2 mm. long including lobes, the lobes 5, apiculate, less than 1 mm. long; corolla cylindric, thin-carnose, 16 to 17 mm. long and 5 mm. in diameter at base, contracted above, glabrous or sparsely short-pilose distally, the lobes 1 to 1.5 mm. long; stamens 10, about 11 mm. long; filaments distinct, 4 mm. long, marginally pilose distally with irregular pale hairs up to 0.4 mm. long; anther sacs 4.5 to 5 mm. long; tubules laterally connate, rigidly cylindric-conical, about 4 mm. long, opening by short oval introrse clefts; stigma peltate.

Type in the herbarium of the New York Botanical Garden, collected in forest at Libano, Department of Tolima, Colombia, altitude 1,400 to 1,700 meters, December 26 to 29, 1917, by F. W. Pennell (no. 3405). Duplicate in U. S. National Herbarium.

DISTRIBUTION: Known only from the type collection.

This species has very distinctive leaves, usually broadest below the middle, with veinlets raised above, rather than obscure as they are in most species of the genus. The soft corollas, which readily become flattened against the older parts of the branchlets where they are borne, are also characteristic.

28. *Macleania reducta* A. C. Smith, sp. nov.

Frutex subpuberulus glabrescens; laminis oblongis vel ovato-oblongis basi cuneatis apice obtusis pinnatinerviis; inflorescentia subfasciculata; calyce subcylindrico parce piloso 3 vel 4 lobato, lobis ovato-triangularibus; corolla cylindrico-urceolata 3 vel 4 lobata; staminibus 6 ad 8 aequalibus, filamentis distinctis ad margines pilosis, tubulis lateraliter connatis quam loculis paullo brevioribus.

Shrub; branchlets terete, puberulous and purplish when young; petioles rugose, 3 to 5 mm. long, puberulous or glabrous, narrowly winged above; leaf blades oblong or ovate-oblong, 4 to 6 cm. long, about 2 cm. broad, cuneate at base, obtuse at apex, subentire at margins, puberulous beneath when young, becoming glabrous, sparsely punctate above, pinnate-veined, the secondary veins 2 or 3 to a side, oriented near base, arcuate-ascending, with the midvein nearly plane above, raised beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary, subfasciculate, 6 to 20 flowered; pedicels subterete, 6 to 8 mm. long, puberulous or glabrous, each subtended by an oblong fimbriate bractlet 2 to 3 mm. long, bibracteolate near

base; calyx tube cylindric, about 3 mm. long and 2 mm. in diameter at anthesis, pilose with scattered pale spreading hairs about 0.3 mm. long; limb spreading, about 4 mm. long including lobes, the lobes 4 (occasionally 3), ovate-triangular, apiculate, 2 to 3.5 mm. long, 4 mm. across, thick-margined; corolla cylindric-urceolate, 11 to 13 mm. long, 3 to 3.5 mm. in diameter, contracted above, essentially glabrous, 4 (or 3) lobed, the lobes triangular, subacute, 1.5 to 2 mm. long; stamens 6, 7, or 8, subequal, 10 to 11 mm. long; filaments dark-castaneous, distinct or loosely coherent at base, about 2.5 mm. long, pilose distally at margins with silky hairs about 0.3 mm. long; anther sacs 4.5 to 5 mm. long; tubules laterally coherent or practically distinct, stiffly cylindric, about 4 mm. long, opening by oval clefts about half their length; style slightly exerted in mature flowers, the stigma truncate.

Type in the herbarium of the New York Botanical Garden, collected in the Andes of Ecuador, without definite locality, 1857 to 1859, by R. Spruce (no. 5842). Duplicates at G, K.

DISTRIBUTION: Known only from the type collection.

This is the only species in this group of *Macleania* which has the calyx lobes and stamens consistently reduced in number. The slender corollas, the densely fasciculate and frequently secund inflorescences, and the narrow oblong leaves are characteristic also.

29. *Macleania ecuadorensis* Hoer. Bot. Jahrb. Engler 42:300. 1909.

Macleania elliptica Hoer. Bot. Jahrb. Engler 42:301. 1909.

Compact shrub; branchlets stout, rugose, cinereous or brownish, puberulous when young, soon glabrous; petioles rugose, essentially glabrous, 3 to 6 mm. long; leaf blades broadly ovate, 4 to 7 cm. long, 2.5 to 6 cm. broad, rounded or broadly cuneate at base, often decurrent on petiole, subentire and slightly revolute at margins, glabrous above, pilose beneath (hairs pale, lax, up to 0.7 mm. long, eventually deciduous), coriaceous, pinnate-veined, the secondary veins usually 3 to a side, arcuate-ascending, connected near margins, with the mid-nerve deeply impressed above, prominent beneath, the veinlets reticulate, obscure above, slightly raised beneath; inflorescence axillary, subfasciculate (peduncle stout, up to 8 mm. long), 8 to 12 flowered, glabrous in all parts; pedicels rugose, 5 to 7 mm. long, each bracteate at base and bibracteolate near base (bracts and bractlets oblong, acute, about 2 mm. long, often glandular-margined); calyx tube short-cylindric, rugose, 2 to 3 mm. long, 3 to 4 mm. in diameter at anthesis; limb 2.5 to 4 mm. long including lobes, the lobes 5, apiculate, 3 to 4 mm. broad; corolla subcylindric, 15 to 16 mm. long, 4 to 5 mm. in diameter, contracted at throat, the lobes 1.5 to 2 mm. long; stamens 10, 11 to 12 mm. long; filaments subnigrescent, distinct, essentially glabrous, 2 to 3 mm. long; anther sacs 4 to 5 mm. long; tubules slender, laterally connate, 5 to 6 mm. long, opening by clefts about half as long; stigma truncate.

TYPE LOCALITY: Volcán Tunguragua, Province of Tunguragua, Ecuador. Type collected by Sodiro (no. 92/2D).

DISTRIBUTION: Andes of Ecuador; apparently rare.

ECUADOR: Mount Atacazo, Sodiro 92/2C (B, type of *M. elliptica*).

TUNGURAGUA: Volcán Tunguragua, Sodiro 92/2D (B, type).

The present plant bears a strong resemblance to certain Ecuadorean specimens of *M. nitida*, from which species it may be considered distinct on the characters mentioned in the key. The types of *M. ecuadorensis* and *M. elliptica* are practically identical, differing only in the slightly larger leaves of the latter.

30. *Macleania loeseneriana* Hoer. Bot. Jahrb. Engler 42:302. 1909.

Macleania laurina Blake, Proc. Biol. Soc. Washington 35:121. 1922.

Subscandent shrub; branchlets terete, subpuberulous and brownish when young, becoming glabrous and cinereous; petioles rugose, glabrous, 6 to 12 mm. long, narrowly winged above; leaf blades oblong-ovate, 5 to 13 cm. long, 2.5 to 6 cm. broad, cuneate or rounded at base, acute or obtuse at apex, entire at margins, glabrous and sometimes sparsely punctate above, essentially glabrous beneath, pinnate-veined, the midvein deeply impressed above, prominent beneath, the secondary veins 3 or 4 to a side, ascending, impressed above, raised beneath, the veinlets obscurely reticulate; inflorescence axillary, short-racemose, 10 to 20 flowered, circumscribed at base by numerous imbricate oblong subpuberulous bracts up to 12 mm. long; pedicels rugose, 16 to 25 mm. long, sparsely puberulous, deciduously bibracteolate near base with minute ovate puberulous bractlets; calyx tube short-cylindric, densely pilose with pale spreading hairs up to 0.3 mm. long, about 3 mm. long and 4 mm. in diameter at anthesis; limb 5 to 7 mm. long including lobes, slightly less pilose than the tube, the lobes 5, apiculate, about 2 mm. long, the sinuses rounded; corolla cylindric-urceolate, pilose as the calyx, becoming subglabrous, up to 21 mm. long and 6 mm. in diameter, contracted at throat, the lobes acute, about 2 mm. long; stamens 10, about 12 mm. long; filaments stout, nigrescent, distinct, about 4 mm. long, densely pilose at margins distally with hairs up to 0.5 mm. long; anther sacs dark castaneous, 5 to 6 mm. long; tubules laterally connate to apex, 4 to 6 mm. long, opening by oval clefts about one-third their length; style about as long as corolla, the stigma truncate.

TYPE LOCALITY: Nanegal Valley, west of Mount Pichincha, Province of Pichincha, Ecuador. Type collected by Sodiro (no. 92/2c).

DISTRIBUTION: Andes of northern Ecuador.

ECUADOR: Sodiro 92/3 (B).

CARCHI: El Angel, about 3,400 meters, Popenoe 1340 (N, type of *M. laurina*).

PICHINCHA: Nanegal Valley, west of Mount Pichincha, Sodiro 92/2c (B, type).

This is a robust and unmistakable species, which, according to Popenoe, is abundant in certain localities. The differences mentioned by Blake in his description of *M. laurina* are observable, but a comparison of the two type specimens leaves no doubt that only one species is represented. Local names: "Chaqui-lulu," "hualicon."

31. *Macleania hirtiflora* (Benth.) A. C. Smith.

Thibaudia hirtiflora Benth. Pl. Hartw. 224. 1846.

Macleania recurva Rusby, Descr. S. Amer. Pl. 76. 1920.

Low shrub about 1 meter high; branchlets terete, densely pilose with pale hairs up to 0.5 mm. long, becoming subglabrous; petioles rugose, 6 to 8 mm. long, puberulous or glabrous, narrowly winged above; leaf blades ovate or ovate-oblong, 6 to 10 cm. long, 2.5 to 4.5 cm. broad, cuneate at base, obtuse or subacute at apex, entire at margins, essentially glabrous above, sparsely pilose beneath with pale spreading hairs up to 0.5 mm. long, pinnate-veined, the midvein slightly impressed above, prominent beneath, the secondary veins 2 or 3 to a side, oriented in basal half, arcuate-ascending, nearly plane above, raised beneath, the veinlets obscurely reticulate; inflorescence axillary, short-racemose, 5 to 15 flowered; rachis rugose, pilose as the branchlets, 1 to 2.5 cm. long; pedicels subterete, sparsely pilose, 8 to 15 mm. long, each subtended by an ovate acute fimbriate bractlet about 3 mm. long, bibracteolate near base, swollen at

apex; calyx tube short-cylindric, irregularly pilose, 3 to 5 mm. long, 3 to 3.5 mm. in diameter at anthesis; limb spreading, 2 to 4 mm. long including lobes, the lobes 5, ovate, apiculate, 1 to 2 mm. long; corolla cylindric-urceolate, 13 to 15 mm. long, 4 to 5 mm. in diameter at base, contracted above, pilose as the calyx (becoming subglabrous), the lobes 1 to 2 mm. long; stamens 10, 9 to 11 mm. long; filaments nigrescent, free, subglabrous, about 2 mm. long; anther sacs 4.5 to 6 mm. long; tubules laterally connate to apex, opening by oval clefts about half their length; stigma peltate.

TYPE LOCALITY: Slopes toward Sotará, Department of El Cauca, Colombia. Type collected by Hartweg (no. 1223).

DISTRIBUTION: Andes of Colombia and Ecuador, altitude 1,800 to 2,800 meters.

COLOMBIA.

MAGDALENA: Santa Marta, *Purdie* (K). Sierra del Líbano, *H. H. Smith* 1964 (Y, type of *M. recurva*). San Sebastian, *Funck* 488 (K).

CUNDINAMARCA: Tequendama, *Pennell* 2643 (N, Y), 2646 (Y).

EL CAUCA: Slopes toward Sotará, *Hartweg* 1223 (K, type).

ECUADOR: *Spruce* 5550 (K).

AZUAY: Between Nabón and Oña, *Jameson* (K).

This is a well-marked species, without close relatives; probably it represents an offshoot of the forbear of *M. nitida*. In so far as can be observed, the Santa Marta specimens and those from farther south are identical, although it is quite conceivable that they have a separate racial history. Of the specimens cited, *Pennell* 2646 is the most distinctive, with leaves noticeably narrowed.

32. *Macleania farinosa* Mansf. Notizbl. Bot. Gart. Berlin 9:436. 1925.

Shrub; branchlets nigrescent or cinereous, puberulous when young, becoming glabrous; petioles rugose, 4 to 7 mm. long, essentially glabrous, winged above; leaf blades ovate or obovate, 5.5 to 9 cm. long, 3 to 6 cm. broad, attenuate at base, rounded or obtuse at apex, entire at margins, essentially glabrous above, loosely pubescent beneath with short irregular hairs, becoming subglabrous, pinnate-veined, the secondary veins 3 to 5 to a side, ascending, with the mid-vein slightly impressed above, prominent beneath, the veinlets reticulate, slightly impressed above, plane beneath; inflorescence axillary, subfasciculate, 3 to 6 flowered, all parts densely farinose-pubescent (hairs crowded, pale yellow, up to 0.3 mm. long); pedicels subterete, 3 to 6 mm. long, bibracteolate near base with ovate bractlets about 4 mm. long, obscurely articulate with calyx; calyx tube short-cylindric, about 3 mm. long and 3 mm. in diameter at anthesis; limb 3 to 4 mm. long including lobes, the lobes 5, deltoid, about 2 mm. long; corolla cylindric, 13 to 14 mm. long, about 3 mm. in diameter, the lobes triangular-oblong, 2 to 3 mm. long; stamens 10, 8.5 to 9 mm. long; filaments nigrescent, glabrous, distinct, about 2.5 mm. long; anther sacs about 4 mm. long; tubules laterally connate, about 3.5 mm. long, opening by elongate oval clefts more than half their length; style slightly exserted, the stigma truncate.

TYPE LOCALITY: East of Huancabamba, Department of Cajamarca, Peru, altitude 2,400 to 2,500 meters. Type collected by Weberbauer (no. 6120).

DISTRIBUTION: Known only from the type collection.

PERU.

CAJAMARCA: East of Huancabamba, *Weberbauer* 6120 (B, type, F, N, Y).

An isolated species, so distinct from others of the genus that it can not be placed with accuracy. It bears somewhat the same relation to the 2-tubuled group of *Macleania* that *M. salapa* bears to the single-tubuled group, although the two species have no other points of comparison.

DOUBTFUL SPECIES

MACLEANIA PULCHRA Hook. f. Bot. Mag. Curtis 90: pl. 5465. 1864.

TYPE LOCALITY: Probably Colombia. Type a cultivated plant, the original collector not stated.

Quite probably this plant is identical with *M. cordifolia*, if weight is given to the illustrations and descriptions. There seems to have been confusion, in the mind of the author, as to whether one or two tubules are present. The characteristic form of the winged calyx as illustrated leads me to place this species in the one-tubuled group.

MACLEANIA CRENULATA Fedtsch. & Basil. Not. Syst. Herb. Hort. Bot. U. S. S. R. 6: 24. 1926.

TYPE LOCALITY: Venezuela or Colombia. Type collected by Funck and Schlim (no. 933).

Said to be allied to *M. speciosissima* and *M. pulchra*, which would indicate that there is probably a single anther tubule, rather than the two implied in the description.

12. *PSAMMISIA* Klotzsch, Linnaea 24:42. 1851

Calyx tube articulate with pedicel, short-cylindric or campanulate; limb erecto-patent, 5 (rarely 2 to 4) lobed, the lobes ovate or triangular, apiculate or subacute; corolla subcylindric, elongate-urceolate or subglobose, 5-lobed, the lobes triangular, subacute; stamens 10 (rarely 8 or 12), equal in length, often nearly as long as corolla; filaments distinct or connate, attached to the anther dorsally near its base; anthers firm, stout, the sacs strongly granular, the tubules about as long as the sacs, distinct, opening by elongate introrse clefts; connectives distally 2-spurred (spurs present on five or ten stamens, acute and evident or rounded and obscure); style filiform, frequently exserted.

Shrubs of various habit, sometimes epiphytic, with coriaceous alternate plinnerved or pinnate-veined petioled leaves; inflorescence axillary or terminal, subfasciculate or racemose; flowers pedicelled, few to many to an inflorescence; pedicels deciduously bibracteolate.

DISTRIBUTION: Mountainous continental tropical America from Costa Rica to Bolivia and eastward to Mount Roraima in British Guiana and the island of Trinidad. Twenty-five species are here described, and in addition there are three names I am unable to place.

From *Macleania* this genus is distinguished by its usually distinct tubules and spurred connectives. The first species mentioned by Klotzsch is *P. cyathifera* (Benth.) Klotzsch, which is synonymous with *P. falcata* (H. B. K.) Klotzsch.

KEY TO THE SPECIES

Corolla broadly conical or subglobose, up to 14 mm. long.

Flowers subfasciculate (rachis hardly perceptible), 2 to 6 to an inflorescence; pedicels 5 to 12 mm. long----- 1. *P. pennellii*.

Flowers racemose (rachis 0.7 to 6 cm. long), more than 6 to an inflorescence; pedicels 12 to 30 mm. long.

Corolla globose, 3 to 8 mm. long at maturity; anthers up to 4.5 mm. long.

Leaves chartaceous, 10 to 18 cm. long; pedicels slender, about 0.8 mm. in diameter (Colombia)----- 2. *P. breviflora*.

Leaves coriaceous, 20 to 35 cm. long; pedicels about 1.5 mm. in diameter (Peru)----- 3. *P. globosa*.

Corolla conical, 8 to 14 mm. long at maturity; anthers 6 to 8 mm. long.

Leaves 2 or 3 times as long as broad (4 to 8 cm. broad or more); rachis up to 2 cm. long.

Pedicels 12 to 15 mm. long; leaves chartaceous; corolla urceolate-cylindric----- 16. *P. sodiroi*.

Pedicels 18 to 25 mm. long; leaves coriaceous; corolla strictly conical----- 4. *P. graebneriana*.

Leaves 3 or 4 times as long as broad (2.5 to 4 cm. broad, rarely more); rachis 3 to 8 cm. long, rarely less----- 5. *P. lehmannii*.

Corolla cylindric-urceolate, 14 mm. long or more (rarely less).

Calyx lobes large, 4 to 8 mm. long; rachis elongate, 7 to 15 cm. long, the flowers distant.

Inflorescence (rachis, pedicels, calyces, and corollas) subglabrous or short-pilose (hairs pale, less than 0.5 mm. long, obscurely septate); calyx lobes 3 or 4; bractlets of the pedicel less than 5 mm. long.

6. *P. ecuadorensis*.

Inflorescence densely ferruginous-tomentose (hairs 1 mm. long or more, clearly septate); calyx lobes 5; bractlets of the pedicel 10 to 12 mm. long----- 7. *P. ferruginea*.

Calyx lobes not exceeding 4 mm. in length.

Flowers large, the calyx 10 to 15 mm. across summit, the corolla up to 40 mm. long, 10 to 15 mm. in diameter at base; anthers stout, about 2 mm. in diameter----- 8. *P. grandiflora*.

Flowers smaller, the calyx not more than 10 mm. across summit, the corolla 14 to 28 mm. long (up to 40 mm. long in no. 14), 5 to 8 mm. in diameter at base; anthers slender, 1 to 1.5 mm. in diameter.

Anthers (including tubules) 6 mm. long or less.

Filaments connate in a tube for nearly their entire length (Central America)----- 9. *P. ramiflora*.

Filaments distinct or loosely coherent at base (South America and Trinidad).

Texture of leaves chartaceous (Venezuela, Guiana, and Trinidad).

10. *P. urichiana*.

Texture of leaves coriaceous (Bolivia, Peru, and Ecuador).

Leaves oblong-lanceolate, about 3 times as long as broad (usually less than 6.5 cm. in breadth)----- 11. *P. pauciflora*.

Leaves broadly oblong-ovate, about twice as long as broad (about 8 cm. in breadth)----- 12. *P. elliptica*.

Anthers (including tubules) 7 mm. long or more.

Venation 7 to 9 pli-nerved, the leaves broadly ovate, about twice as long as broad.

Leaf base subcordate; tubules about one-fourth as long as anther sacs, the thick connective tissue continued into the subcoriaceous tubules----- 13. *P. killipii*.

Leaf base cuneate; tubules about half as long as anther sacs, the thick connective tissue not continued into the submembranous tubules.

Filaments connate; leaves cuneate-attenuate at base (Trinidad).

14. *P. recurvata*.

Filaments distinct; leaves cuneate at base.

Calyx lobes 3 to 5, often in a state of semifusion, up to 3 mm. long (northern Colombia)----- 15. *P. elegans*.

Calyx lobes 5, about 2 mm. long (Ecuador and Peru).

25. *P. ulbrichiana*.

Venation 5 (rarely 7) pli-nerved or pinnate-veined; leaves oblong-ovate, at least 3 times as long as broad.

Alternate connectives (or all connectives) with noticeable spurs, the spurs nearly twice as broad as the connective immediately below.

Venation pinnate, the secondary veins spreading, 4 to 6 to a side.

16. *P. sodirol*.

Venation pli-nerved, the secondary nerves ascending, oriented near base, 2 or 3 to a side.

Filaments connate----- 17. *P. columbiensis*.

Filaments distinct.

Branchlets, pedicels, and calyces glabrous.

Filaments and connectives glabrous or essentially so.

18. *P. macrophylla*.

Filaments and connectives pilose distally at margins (hairs 0.1 to 0.4 mm. long).

Anthers (including tubules) 8 to 9 mm. long (rarely more).

19. *P. guyanensis*.

Anthers (including tubules) 10 to 12 mm. long (rarely less).

Rachis 1 to 4 cm. long; flowers 6 to 10 per centimeter on mature rachis (Peru)----- 20. *P. coarctata*.

Rachis 3 to 7 cm. long (rarely 2 cm.); flowers 2 to 4 per centimeter on mature rachis (Colombia).

21. *P. falcata*.

Branchlets, pedicels, and calyces short-pubescent (hairs pale, up to 0.3 mm. long)----- 22. *P. lanceolata*.

Alternate connectives obscurely spurred (spurs rounded, hardly broader than the connective immediately below, rarely sub-acute).

Leaves pilose beneath (hairs dark brown, stout, up to 0.3 mm. long, 2 to 4 per sq. mm. of surface); pedicels with bractlets 3 to 5 mm. long----- 23. *P. penduliflora*.

Leaves glabrous beneath; pedicels minutely bibracteolate, the bractlets less than 2 mm. long.

Pedicels up to 20 mm. long (rarely to 25 mm.); leaves predominantly 5-pi-nerved (Venezuela and northern Colombia).

24. *P. hookeriana*.

Pedicels 20 to 35 mm. long (rarely less); leaves predominantly 7-pi-nerved (Ecuador and Peru)----- 25. *P. ulbrichiana*.

1. *Psammisia pennellii* A. C. Smith, sp. nov.

Frutex parvus; laminis oblongis vel ovato-oblongis petiolatis basi cuneatis vel attenuatis apice acuminatis pinnatinerviis vel pli-nerviis; inflorescentia fasciculata, floribus breviter pedicellatis glabris; corolla conico-subglobosa; staminibus aequalibus alternatim bicalcaratis, calcaribus obtusis, tubulis distinctis quam loculis multo brevioribus.

Low shrub; branchlets terete, glabrous, brownish when young, becoming cinereous; petioles rugose, 4 to 12 mm. long, glabrous, narrowly winged above; leaf blades oblong or ovate-oblong, 7 to 17 cm. long, 3 to 6 cm. broad, cuneate or attenuate at base, acuminate at apex, entire and narrowly revolute at margins, pinnate-veined or pli-nerved, the secondary veins 2 or 3 to a side,

ascending, with the midvein plane above, raised beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence axillary, fasciculate, 2 to 5 flowered; pedicels striate, 5 to 12 mm. long, glabrous, bibracteolate at base with triangular bractlets about 1 mm. long; calyx glabrous, strongly rugose, the tube short-cylindric, 3 to 4 mm. long and 4 mm. in diameter at anthesis, the limb spreading, 2 to 4 mm. long including lobes, the lobes 5, minutely apiculate, subcartilaginous, about 5 mm. across; corolla broadly conical-subglobose, glabrous, 5 to 7 mm. long, 5 to 6 mm. in diameter at middle, contracted to about 2 mm. in diameter at throat, 5-lobed, the lobes erect or spreading, triangular, subacute, about 1 mm. long; stamens 10, 5 to 5.5 mm. long; filaments thick, dark castaneous, distinct, about 1.5 mm. long and 1 mm. across, leading into similar broad connectives, the connectives sparsely pubescent at margins with pale hairs up to 0.5 mm. long, alternately 2-spurred, the spurs rounded; anther sacs about 3.5 mm. long, stout; tubules distinct to base, 1 to 1.5 mm. long, opening by oval clefts nearly their entire length; style rigid, 4 to 5 mm. long, the stigma truncate.

Type in the U. S. National Herbarium, no. 1,143,644, collected in forest below San José, near San Antonio, Department of El Cauca, Colombia, altitude 2,100 to 2,500 meters, July 1, 1922, by F. W. Pennell (no. 7628). Duplicates at B, G, Y.

DISTRIBUTION: Andes of western Colombia, 1,800 to 2,800 meters.

COLOMBIA.

CALDAS: Pinares, above Salento, *Pennell* 9304 (Y).

EL VALLE: La Cumbre, *Pennell & Killip* 5750 (B, N, Y).

EL CAUCA: San José, near San Antonio, *Pennell & Killip* 7290 (N, Y).

Distinguished from other species of the small-flowered group by its few-flowered inflorescences and short pedicels.

2. *Psammisia breviflora* (Benth.) Klotzsch, *Linnaea* 24: 44. 1851.

Thibaudia breviflora Benth. Pl. Hartw. 224. 1846.

Low shrub; branchlets subterete, brownish, sparsely puberulous when young, becoming glabrous; petioles rugose, 3 to 5 mm. long, glabrous; leaf blades oblong or lanceolate-oblong, 10 to 18 cm. long, 2.5 to 4 cm. broad, subcuneate at base, caudate-acuminate at apex, entire at margins, glabrous, 5-ply-nerved, the secondary nerves oriented above base to a distance of 2 cm., ascending, with the midnerve plane or slightly impressed above, prominent beneath, the veinlets reticulate, distinctly raised on both surfaces; inflorescence axillary, racemose, 4 to 10 flowered, glabrous in all parts; rachis terete, slender, about 0.8 mm. in diameter, 0.5 to 5 cm. long; pedicels terete, 15 to 30 mm. long, each subtended by a narrowly oblong bractlet 2 to 3 mm. long, minutely bibracteolate near base, gradually swollen distally; calyx tube short, obconical, about 3 mm. long and 4 mm. in diameter at summit at anthesis; limb about 1.5 mm. long including lobes, the lobes 5, triangular, acute, about 1 mm. long; corolla cylindric-subglobular, 5 to 9 mm. long, about 5 mm. in diameter at middle, contracted at base and apex, the lobes about 1 mm. long; stamens 10, about 4.5 mm. long; filaments slender, dark castaneous, distinct, puberulous dorsally and marginally toward apex with brownish hairs up to 0.2 mm. long, leading into slender connectives, the connectives alternately 2-spurred, the spurs rounded; anther sacs incurved at base, about 3 mm. long; tubules cylindric-conical, 1 to 1.5 mm. long, opening by oval clefts nearly as long; style slender, nearly as long as corolla, the stigma subhemispherical.

TYPE LOCALITY: Andes of Popayán, Department of El Cauca, Columbia. Type collected by Hartweg (no. 1225*).

DISTRIBUTION: Andes of western Colombia, altitude 1,500 to 2,800 meters.
COLOMBIA.

BOLÍVAR: Cascada Chorrón, south of Antizales, *Pennell* 4406 (Y).

ANTIOQUÍA: Amalfi, *Kalbreyer* 1670 (B, K).

EL CHOCÓ: Concepción, *Archer* 2002 (N, Y), 2209 (N).

EL CAUCA: San José, near San Antonio, *Pennell* 7629 (N, Y). Vicinity of Popayán, *Hartweg* 1225 * (K, type); *Lehmann* 5438 (K).

This species and the following are distinguished from others of the genus by their very short, essentially globose corollas. From the following species, *P. breviflora* is separated by its chartaceous and small leaves and its slender habit.

3. *Psammisia globosa* A. C. Smith, sp. nov.

Frutex subscandens; laminis lanceolato-oblongis petiolatis basi attenuatis apice acuminatis pinnatinerviis; inflorescentia breviter racemosa; floribus glabris; calyce campanulato, limbo erecto; corolla subglobosa parva; staminibus aequalibus, filamentis ad margines pilosis, connectivis alternis obscure bicalcaratis, tubulis gracilibus quam oculis paullo brevioribus.

Subscandent shrub; branches elongate to several meters; branchlets terete, brownish, glabrous; petioles rugose, glabrous, stout, 3 to 5 mm. in diameter, 10 to 20 mm. long, narrowly winged above; leaf blades lanceolate-oblong, 20 to 35 cm. long, 3.5 to 9 cm. broad, attenuate at base, acuminate at apex, entire and slightly revolute at margins, coriaceous, glabrous, pinnate-veined, the mid-vein stout, raised on both surfaces, the secondary veins 5 to 8 per side, spreading, connected near margins, slightly raised on both surfaces, the veinlets reticulate, slightly raised or plane; inflorescence axillary, short-racemose, 6 to 8 flowered, glabrous in all parts; rachis rugose, 7 to 12 mm. long; pedicels subrugose, 8 to 15 mm. long, subtended by a subcoriaceous oblong subacute bract about 2 mm. long, minutely bibracteolate near base, swollen distally; calyx tube subrugose, violaceous or subnigrescent, broadly campanulate, about 3 mm. long and 5 mm. in diameter at anthesis; limb erect, 1 to 2 mm. long including lobes, the lobes 5, broadly triangular, subacute, about 3 mm. across; corolla subglobose, 3 to 4 mm. long, about 4 mm. in diameter (apparently quite mature), the lobes acute, about 1 mm. long; stamens 10, about 3.4 mm. long; filaments broad, nigrescent, about 1.5 mm. long, densely pilose at margins with hairs about 0.1 mm. long, leading imperceptibly into similar broad connectives, the connectives alternately obscurely 2-spurred; anther sacs stout, about 1.8 mm. long; tubules slender, cylindric-conical, about 1.3 mm. long, opening by broad clefts nearly as long; style rigid, subrugose, about as long as corolla, the stigma truncate; fruit subspherical, carnose, rich pink, up to 1 cm. in diameter, the calyx limb persistent.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected in Peru in 1835, by A. Mathews (no. 2077).

DISTRIBUTION: Andes of Peru, altitude 1,400 to 1,700 meters.

PERU.

JUNÍN: Schunke Hacienda, above San Ramón, *Macbride* 5754 (F); *Killip & Smith* 24868 (N, Y).

This is a beautiful plant with elongate branches and drooping leaves, the minute flowers forming delicate little axillary clusters. From the preceding it is distinguished by its larger, more coriaceous leaves and more robust habit.

EXPLANATION OF PLATE 9.—*Psammisia globosa*, from photograph of type sheet. About one-half natural size.

4. *Psammisia graebneriana* Hoer. Bot. Jahrb. Engler 42: 304. 1909.

Low shrub; branchlets terete, stout, brownish, glabrous; petioles rugose, 4 to 12 mm. long, glabrous, winged above; leaf blades ovate-oblong, 7 to 30 cm. long, 4 to 10 cm. broad, cuneate at base, acute or short-acuminate at apex, subentire and slightly revolute at margins, glabrous, pinnate-veined, the secondary veins 3 or 4 to a side, ascending, with the midvein slightly impressed above, prominent beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence axillary, short-racemose, 8 to 16 flowered, glabrous in all parts; pedicels striate, 20 to 30 mm. long at maturity, each subtended by a coriaceous oblong bractlet about 3 mm. long, minutely bibracteolate near base, swollen distally; calyx strongly rugose, the tube short-cylindric, 4 to 5 mm. long and about 6 mm. in diameter at anthesis, the limb spreading, 3 to 4 mm. long including lobes, the lobes triangular, subacute, 2 mm. long; corolla urceolate, 9 to 12 mm. long, about 6 mm. in diameter at base, contracted at throat, the lobes 2 to 3 mm. long; stamens 6 to 7.5 mm. long; filaments stout, dark castaneous, glabrous, 2 to 3 mm. long, leading into broad connectives, the connectives 2-spurred, alternately more slender and more obviously spurred; anther sacs stout, about 4.5 mm. long; tubules slender, 2 to 3 mm. long, opening by oval clefts nearly as long; style stout, nearly as long as corolla, the stigma truncate.

TYPE LOCALITY: Río Pilatón, Province of Pichincha, Ecuador, altitude 800 to 1,000 meters. Type collected by Sodiro (no. 92/14).

DISTRIBUTION: Andes of Colombia and northern Ecuador, altitude 800 to 3,100 meters.

COLOMBIA: *Triana* (B). *Purdie* (G, K).

CUNDINAMARCA: Bogotá, *Tracey* 20 (K). El Peñon, southwest of Sibaté, *Pennell* 2420 (Y).

EL CAUCA: *Triana* 2670 (K, B). Canaan, Mount Puracé, *Pennell & Killip* 6519 (N, Y). Paletara, *Pennell* 6953 (Y).

NARIÑO: Páramo Chimbalan, *André* 3028 (K).

ECUADOR.

PICHINCHA: Río Pilatón, *Sodiro* 92/14 (B, type). Nanegal Valley, *Sodiro* 92/3b (B).

This species shows gradations to the following. Since their ranges are somewhat the same, they possibly hybridize.

5. *Psammisia lehmannii* Hoer. Bot. Jahrb. Engler 42: 305. 1909.

Shrub; branchlets striate, brownish, glabrous; petioles rugose, 6 to 10 mm. long, glabrous, narrowly winged; leaf blades oblong or lanceolate-oblong, 9 to 18 cm. long, 2 to 4 cm. broad, cuneate-attenuate at base, acute at apex, entire and strongly revolute at margins, thick-coriaceous, glabrous, pinnate-veined, the secondary veins 3 to 5 to a side, ascending, with the midvein impressed above, prominent beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence axillary near ends of branchlets, racemose, 10 to 20 flowered, glabrous in all parts; rachis subterete, 2 to 8 cm. long; pedicels rugose, 18 to 40 mm. long, each subtended by a deciduous oblong bractlet about 3 mm. long, bibracteolate below the middle, 3 to 5 per centimeter of rachis; calyx strongly rugose, the tube short-cylindric, 3 to 4 mm. long and about 5 mm. in diameter at anthesis, the limb spreading, 3 to 5 mm. long including lobes, the lobes ovate-apiculate, 1 to 1.5 mm. long; corolla broadly conical, 8 to 12 mm. long at maturity, 7 mm. in diameter at base, contracted at throat, the lobes erect, thick-carnose, 1.5 to 2 mm. long; stamens 6.5 to 8.5 mm. long; filaments coherent at base, nigrescent, slightly puberulous dorsally near apex, about 2.5

mm. long, narrowed above into short connectives, the connectives 2-spurred, the spurs rounded and alternately larger; anther sacs stout, 3.5 to 5 mm. long; tubules narrowly cylindric, 2.5 to 3 mm. long, opening by introrse clefts nearly their entire length; style stout, nearly as long as corolla, the stigma truncate; fruit subspherical, up to 12 mm. or more in diameter, the calyx limb persistent.

TYPE LOCALITY: Western slopes of Páramo de Guanacas, Department of El Cauca, Colombia, altitude 2,700 to 3,000 meters. Type collected by Lehmann (no. 4961).

DISTRIBUTION: Andes of Colombia, altitude 2,000 to 3,000 meters.

COLOMBIA: Páramo Purdef, *André* 577 (K, Y).

CUNDINAMARCA: La Selva, *Tracey* 270 (K).

HUILA: Balsillas, on Río Balsillas, *Rusby & Pennell* 750 (F, G, N, Y), 751 (N, Y).

ANTIOQUÍA: Quebrada del Ato, above Bello, *Archer* 202 (N).

EL CAUCA: Western slopes of Páramo de Guanacas, *Lehmann* 4961 (B, type, F, G).

6. *Psammisia ecuadorensis* Hoer. Bot. Jahrb. Engler 42:308. 1909.

Psammisia kraenzliniana Hoer. Bot. Jahrb. Engler 42:308. 1909.

Psammisia puberula Hoer. Bot. Jahrb. Engler 42: 309. 1909.

Low shrub; branchlets terete, brownish, glabrous or brown-puberulous; petioles rugose, subglabrous, 3 to 5 mm. long; leaf blades ovate-oblong, 8 to 18 cm. long, 2.5 to 8 cm. broad, rounded or slightly subcordate at base, obtusely acuminate at apex, entire at margins, glabrous above, sparsely puberulous or glabrous beneath, 5 to 7 pli-nerved, the secondary nerves oriented near base, with the midnerve impressed above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary near ends of branchlets, racemose, 4 to 16 flowered; rachis subterete, puberulous or glabrous, 7 to 15 cm. long; pedicels about 2 per centimeter of rachis, subterete, 8 to 25 mm. long, each subtended by a small deciduous bractlet, deciduously bibracteolate near base with linear bractlets up to 4 mm. long; calyx tube puberulous or glabrous, subcylindric or subspherical, 2 to 4 mm. long and 3 to 5 mm. in diameter at anthesis; limb suberect, large, 7 to 12 mm. long including lobes, the lobes 3 (rarely 2 or 4), sometimes in a state of fusion, triangular, acute, 4 to 8 mm. long, 5 to 8 mm. across base; corolla subcylindric, 14 to 35 mm. long, 5 to 6 mm. in diameter at base, contracted distally, glabrous or puberulous; stamens 10 to 12 mm. long; filaments dark castaneous, distinct, about 4 mm. long, densely pilose distally with pale straight hairs up to 0.6 mm. long, leading into slightly narrower connectives, the connectives 2-spurred, alternately narrower and more obviously spurred (1.5 mm. across spurs, about 0.6 mm. immediately below); anther sacs produced at base, 5 to 6 mm. long; tubules cylindric, 2 to 4 mm. long; style subterete, about as long as corolla, the stigma truncate.

TYPE LOCALITY: Ecuador. Type collected by Sodiro (no. 92/9).

DISTRIBUTION: Andes of Ecuador and possibly of southern Colombia, altitude 1,400 to 3,000 meters.

ECUADOR OR COLOMBIA: *André* (K). Salitu, *André* 1045 (K). Mindo, *André* (K). Cascajal, *André* 3718 (K). Miebli, *André* (K). San Florencio, *André* (K). Alto San Juan, *André* 2070 (K).

ECUADOR: Sodiro 92/9 (B, type). Corazón, *André* (K). San Pablo, *André* (K). Cauzacito, Guanasa, *Sodiro* 92/7 (B, type of *P. kraenzliniana*).

PICHINCHA: Andes near Quito, *Couthouy* (G). Near Bolona, *Sodiro* 92/4 (B, type of *P. puberula*). Nanegal Valley, *Sodiro* 92/6 (B).

CHIMBORAZO: Mount Chimborazo, *Spruce* 6169 (K).

EL ORO: Between La Chorita and Portovelo, *Hitchcock* 21166 (N, Y).

AZUAY: Cuenca, *Lehmann* K174 (K).

Hoerold's grounds for describing three species in this coherent group are not clear. The only conceivable distinctions are those of degree. For instance, the leaves of *P. puberula* are truncate at base, as compared to the faintly subcordate leaves of the other "types"; the corollas vary from 17 mm. to 35 mm. in length, a condition due to age alone. Of the above specimens, *Hitchcock* 21166 is the most nearly glabrous; the three "types" are identical in degree of pubescence.

As here regarded, this species is very well marked and is quite unmistakable, having as a close relation only the following, from which it is easily distinguished by the key characters.

7. *Psammisia ferruginea* A. C. Smith, sp. nov.

Frutex; ramis ramulisque dense ferrugineo-pilosis; laminis oblongis vel ovato-oblongis breviter petiolatis ferrugineo-pilosis basi truncatis vel subcordatis apice caudato-acuminatis 5 ad 7 plinerviis; inflorescentia longe racemosa dense ferrugineo-pilosa; calyce campanulato, limbo suberecto quam tubo duplo longiore 5-lobato, lobis magnis lanceolato-triangularibus; corolla cylindrica 5-lobata; staminibus aequalibus alternatim bicalcaratis, calcaribus subacutis, filamentis laxe connatis superne pilosis, tubulis quam loculis paullo brevioribus.

Shrub; branchlets subterete, striate, densely pilose (hairs ferruginous, spreading, 1 to 1.5 mm. long); petioles subrugose, 3 to 5 mm. long, pilose as the branchlets; leaf blades oblong or ovate-oblong, 10 to 14 cm. long, 3.5 to 6 cm. broad, truncate or subcordate at base, caudate-acuminate at apex, entire at margins, coriaceous, ferruginous-pilose on both surfaces (hairs spreading, about 1 mm. long, 5 to 10 per square millimeter on lower surface, sparser and deciduous above), 5 to 7 plinerved, the secondary nerves oriented near base, arcuate-ascending, with the midnerve impressed above, prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces; inflorescence axillary, long-racemose, 10 to 25 flowered, densely ferruginous-pilose on all external surfaces (hairs up to 2 mm. long); rachis stout, 8 to 18 cm. long; pedicels subterete, 8 to 15 mm. long, bracteate at base and bibracteolate near base (bractlets lanceolate, 10 to 12 mm. long); calyx tube short-conical or campanulate, 4 to 5 mm. long, about 4 mm. in diameter at anthesis; limb about 20 mm. long including lobes, the lobes 5, lanceolate-triangular, 7 to 8 mm. long, about 4 mm. broad, parallel-veined; corolla cylindric, 32 to 36 mm. long at maturity, 4 to 5 mm. in diameter near base, contracted at the long throat, the lobes oblong, subacute, 3 mm. long, 1.5 mm. broad; stamens 10, about 13 mm. long; filaments dark castaneous, loosely connate in a tube, about 4 mm. long, dorsally pilose distally with ferruginous hairs, leading into similar slender connectives, the connectives alternately two-spurred, the spurs subacute, obvious; anther sacs about 6 mm. long; tubules subcylindric, about 4 mm. long, opening by clefts more than half as long; style exerted, the stigma truncate or subpeltate.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected near Pilispi, "New Grenada," altitude about 1,200 meters, by W. Lobb (no. 89).

DISTRIBUTION: Probably limited to the Andes of southern Colombia, altitude 1,200 to 2,400 meters.

COLOMBIA.

EL CAUCA: Timbiquí, *Lehmann* K173 (K).

NARIÑO: Between Tuquerres and San Pablo, *Triana* 2681 (K). San Pablo, *André* 3341 (K).

Because of confusion concerning the Lobb collections, it is impossible to determine the precise locality of the type specimen, which is the best sheet of those cited. Most of the Lobb plants appear to have been collected in Peru, in spite of the usual notation "Columbia" or "New Grenada." The present specimen, however, agrees so well with sheets which come from southern Colombia that I am inclined to believe it also was collected there.

Psammisia ferruginea is unmistakably distinct, being sharply marked from the preceding by its ferruginous tomentum, as well as by other characters mentioned in the key. The necessity of describing a new species of this alliance, while at the same time reducing two names of Hoerold as indicated above, is regrettable but unavoidable.

EXPLANATION OF PLATE 10.—*Psammisia ferruginea*, from photograph of type sheet. About one-half natural size.

8. *Psammisia grandiflora* Hoer. Bot. Jahrb. Engler 42:305. 1909.

Low shrub; branchlets terete, glabrous, cinereous; petioles rugose, 3 to 5 mm. long, glabrous, narrowly winged above; leaf blades ovate, 8 to 15 cm. long, 3 to 6 cm. broad, cuneate at base, caudate-acuminate at apex, entire and revolute at margins, glabrous, pinnate-veined, the midvein slightly impressed above, prominent beneath, the secondary veins 2 to 4 to a side, oriented in basal half, arcuate-ascending, nearly plane above, raised beneath, the veinlets reticulate, plane above, slightly raised beneath; inflorescence axillary near ends of branchlets, fasciculate or short-racemose, 2 to 4 flowered, essentially glabrous in all parts; pedicels rugose, 10 to 15 mm. long, each subtended by a triangular bractlet about 2 mm. long, minutely bibracteolate below middle, obscurely articulate with calyx; calyx tube obconical, 4 to 9 mm. long, 5 to 8 mm. in diameter at summit at anthesis; limb 3 to 5 mm. long, nearly truncate (lobes 5, apiculate, 1 to 2 mm. long); corolla membranous, subcylindric, 25 to 40 mm. long at maturity, 8 to 15 mm. in diameter at base, tapering gradually distally, the lobes elongate-triangular, about 3.5 mm. long; stamens 14 to 17 mm. long; filaments castaneous, broad (2.5 mm. across base), distinct or slightly coherent at base, 5 to 6 mm. long, marginally pilose distally with a few pale hairs about 0.3 mm. long, leading into slightly narrower connectives, the connectives 2-spurred (about twice as broad across spurs as immediately below); anther sacs incurved at base, stout, 6 to 7 mm. long; tubules cylindric, 5 to 10 mm. long; style about as long as corolla.

TYPE LOCALITY: La Ceja, Department of Antioquia, Colombia, altitude 2,200 meters. Type collected by Triana (no. 37).

DISTRIBUTION: Central Cordillera of Colombia, altitude 2,200 to 3,300 meters. COLOMBIA: *Linden* 951 (K).

ANTIOQUÍA: La Ceja, *Triana* 37 (B, type).

CALDAS: Río San Rafael, below Cerro Tatamá, *Pennell* 10403 (Y). Cerro Tatamá, *Pennell* 10458 (Y), 10459 (Y).

This beautiful species is distinguishable by its large flowers, which are sometimes suggestive of those of *Semiramisia*. In leaf character and in general habit it resembles *P. pennellii*, from which it differs by the unusual floral development.

9. *Psammisia ramiflora* Klotzsch, *Linnaea* 24:44. 1851.

Psammisia symphystemona Donn. Smith, Bot. Gaz. 20:291. 1895.

Low shrub, usually epiphytic; branchlets slender, terete, glabrous, with a deciduous brownish bark; petioles rugose, 3 to 5 mm. long, glabrous, narrowly winged above; leaf blades oblong or ovate-oblong, 8 to 17 cm. long, 3 to 7 cm.

broad, cuneate at base, caudate-acuminate at apex, entire at margins, glabrous, 5-ply-nerved, the secondary nerves oriented slightly above base, ascending near margins, with the midnerve slightly impressed or nearly plane above, prominent beneath, the veinlets copiously reticulate, raised on both surfaces; inflorescence axillary, subfasciculate or short-racemose (rachis less than 1 cm. long), essentially glabrous in all parts, 4 to 15 flowered; pedicels slender, striate, 8 to 25 mm. long, each subtended by an oblong bractlet about 2 mm. long, minutely bibracteolate near base; calyx-tube subcylindric or broadly obconical, about 3 mm. long and 2.5 mm. in diameter at summit at anthesis; limb 3.5 to 4 mm. long including lobes, the lobes 5, triangular, acute, about 1.5 mm. long; corolla subcylindric, 20 to 30 mm. long, 4 to 5 mm. in diameter near base, contracted at the long throat, the lobes oblong, about 3 mm. long; stamens 10 (rarely 12, in which case all the flower parts are 6-merous and in a state of partial fusion), 8 to 9 mm. long; filaments membranous, castaneous, connate for their entire length, about 4 mm. long, leading into narrow nigrescent connectives, the connectives marginally pilose (hairs pale, up to 0.2 mm. long), 2-spurred, alternately slightly longer, narrower, and more obviously spurred; anther sacs 3 to 3.2 mm. long; tubules distinct to base or semicoherent, cylindric-conical, 2 to 3 mm. long, opening by oval clefts nearly as long; stigma truncate.

TYPE LOCALITY: Veraguas, Panama. Type collected by Warszewicz.

DISTRIBUTION: Costa Rica and Panama, altitude 1,400 to 2,000 meters.

COSTA RICA: *Wercklé* (?) 26 (B). Cascajal, *Lankester* 109 (K), K247 (K).

Agua Caliente, *Stork* 1313 (F).

ALAJUELA: Mariposa, *Cooper* 5842 (B, G, N, type of *P. symphystemona*).

SAN JOSÉ: La Palma, *Standley* 38211 (N); *Wercklé* 11606 (N).

CARTAGO: Alto de La Estrella, *Standley* 39275 (N).

PANAMA.

VERAGUAS: *Warszewicz* (B, type).

PANAMA: Cerro Azul, *Goldman* 1870 (N).

A well-marked species by its small anthers and connate filaments. A local name in Costa Rica is "colmillo."

10. *Psammisia urichiana* (Britton) A. C. Smith.

Cavendishia urichiana Britton, Bull. Torrey Club 48: 336. 1921.

Low shrub, usually epiphytic; branchlets terete, slender, brownish, glabrous; petioles subterete, 7 to 10 mm. long, glabrous, narrowly winged above; leaf blades ovate or oblong-ovate, 15 to 20 cm. long, 4 to 8 cm. broad, cuneate at base, caudate-acuminate at apex, entire and slightly revolute at margins, glabrous, thin-coriaceous or chartaceous, 5-ply-nerved, the secondary nerves oriented near base, with the midnerve slightly impressed above, prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces; inflorescence axillary, subfasciculate or short-racemose (rachis not exceeding 8 mm. in length), essentially glabrous in all parts, 4 to 8 flowered; pedicels striate, 8 to 15 mm. long, each subtended by an oblong bractlet about 3 mm. long, minutely bibracteolate near base; calyx tube subcylindric or broadly obconical, 2 to 4 mm. long, about 3 mm. in diameter at anthesis; limb about 3 mm. long including lobes, the lobes 5, triangular, apiculate, 1 mm. long or less; corolla subcylindric, 23 to 27 mm. long, about 5 mm. in diameter, contracted above, the lobes elongate-triangular, about 3 mm. long; stamens 8 to 9 mm. long; filaments castaneous, slender, distally pilose at margins with sparse hairs about 0.2 mm. long, distinct, 4 to 4.5 mm. long, leading into slender connectives, the connectives 2-spurred (alternately narrower and more obviously spurred), the spurs acute, twice as broad as the connective imme-

diately below; anther sacs 3.5 to 4 mm. long; tubules distinct or coherent at base, elongate-conical, about 2 mm. long; stigma truncate.

TYPE LOCALITY: Heights of Aripo, Trinidad. Type collected by Britton and Freeman (no. 2364).

DISTRIBUTION: Apparently rare in mountains of Trinidad, British Guiana, and Venezuela.

TRINIDAD: Heights of Aripo, *Britton & Freeman* 2364 (N, Y, type).

BRITISH GUIANA: Mount Roraima, 1,700 meters, *Ule* 8714 (B, Go).

VENEZUELA.

ARAGUA: Between El Portachuelo and Ocumare, *Pittier* 11377 (N). Colonia Tovar, 2,000 meters, *Jahn* 1201a (N).

The above-cited specimens are indubitably conspecific, in spite of the unusual distribution. This species, which has been confused with *P. guianensis*, is quite distinct from that on the basis of its small anthers and comparatively thin leaves.

11. *Psammisia pauciflora* Griseb., sp. nov.

Frutex; laminis oblongis basi cuneatis apice caudato-acuminatis 5-pli-nerviis; inflorescentia subfasciculata vel breviter racemosa glabra; calyce subcylindrico, limbo suberecto tubum subaequante; corolla subcylindrica; filamentis superne pilosis, connectivis bicalcaratis, tubulis loculos subaequantibus.

Shrub; branchlets terete, brownish, glabrous; petioles slightly rugose, 6 to 10 mm. long, glabrous, narrowly winged above; leaf blades oblong, 15 to 25 cm. long, 5 to 7 cm. broad, cuneate at base, caudate-acuminate at apex, entire at margins, glabrous, thick-coriaceous, 5-pli-nerved, the secondary nerves oriented near base, with the midnerve impressed above, strongly prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces; inflorescence axillary, subfasciculate or short-racemose (rachis seldom up to 1 cm. long), essentially glabrous in all parts, 6 to 10 flowered; pedicels striate, 10 to 15 mm. long, each subtended by an oblong acute bractlet about 2 mm. long, minutely biplicate near base; calyx tube subcylindric or broadly obconical, 2.5 to 3 mm. long, about 4 mm. in diameter at anthesis; limb suberect, about 3 mm. long including lobes, the lobes 5, apiculate, usually less than 1 mm. long; corolla subcylindric, 19 to 27 mm. long, 4 to 5 mm. across base, contracted at the long throat, the lobes elongate-triangular, 2.5 to 3 mm. long; stamens 10, 6 to 8 mm. long; filaments castaneous, free, distally pilose, especially at margins, with pale spreading hairs about 0.3 mm. long, leading into slender connectives, the connectives 2-spurred, alternately longer, narrower and more obviously spurred, the spurs subacute, about twice as broad as the connective immediately below; anther sacs 2.5 to 3 mm. long; tubules laterally connate at base, free distally, elongate-conical, 2 to 3 mm. long; stigma truncate; fruit subspherical, up to 1 cm. in diameter, the calyx limb persistent.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected at San Gován, Peru, by Lechler (no. 2386).

DISTRIBUTION: Andes of southeastern Columbia, Peru, and northern Bolivia, altitude 750 to 2,000 meters.

COLOMBIA.

CUNDINAMARCA: Susumuco, *André* 958 (K).

META: Villavicencio, *André* (K). Forest of Upín, *André* (K).

BOLIVIA.

LA PAZ: Mapiri, *Buchtien* 1178 (B), 2013 (N); *Bang* 1516 (B, F, N, Y); *Rusby* 2037 (N, Y). Hacienda Simaco, Tipuani, *Buchtien* 5514 (N, Y), 7431 (B, N, Y).

The species has not been previously described, but the name given by Grisebach²⁵ is fitting and has been used in this treatment. It is a coherent species, forming with *P. urichiana* and *P. elliptica* a distinct group within the genus. The specimens collected by André have slightly broader leaves than the Bolivian specimens, but appear conspecific.

12. *Psammisia elliptica* (Rusby) A. C. Smith.

Macleania elliptica Rusby, Bull. N. Y. Bot. Gard. 8:111. 1912.

Shrub; branchlets terete, striate, glabrous, brownish; petioles slightly rugose, 8 to 10 mm. long, glabrous, narrowly winged above; leaf blades elliptic-ovate, 16 to 18 cm. long, 8 to 9 cm. broad, cuneate at base, caudate-acuminate at apex (acumen abrupt, slender, up to 15 mm. long), entire at margins, glabrous, thick-coriaceous, 5 to 7 pli-nerved, the secondary nerves oriented slightly above base, with the midnerve impressed above, very prominent beneath, the veinlets copiously reticulate, nearly plane above, raised beneath; inflorescence axillary, short-racemose (rachis less than 1 cm. long), 8 to 12 flowered, glabrous in all parts; pedicels striate, 14 to 18 mm. long, each subtended by an ovate acute bractlet about 1.5 mm. long, minutely bibracteolate near base; calyx tube short-cylindric, about 2 mm. long and 2.5 mm. in diameter at anthesis; limb spreading, about 2.5 mm. long, nearly truncate, the 5 teeth apiculate; corolla subcylindric, 20 to 25 mm. long, about 4 mm. in diameter, contracted above, the lobes oblong, 2 to 3 mm. long; stamens about 8 mm. long; filaments dark castaneous, slender, distinct, about 3 mm. long, distally pilose at margins with stiff spreading hairs about 0.2 mm. long, leading into slender connectives, the connectives 2-spurred, alternately narrower, longer, and more obviously spurred, the spurs subacute, prominent; anther sacs 3 to 3.5 mm. long; tubules laterally connate at base, free distally, elongate-conical, 2.5 to 3 mm. long; style up to 30 mm. long, the stigma subhemispherical.

TYPE LOCALITY: Río Pelichuco, Department of La Paz, Bolivia, altitude about 1,200 meters. Type collected by R. S. Williams (no. 2487).

DISTRIBUTION: Known only from the type collection.

BOLIVIA.

LA PAZ: Río Pelichuco, R. S. Williams 2487 (Y, type).

Very closely allied to the preceding, from which it differs only in its broader leaves. This character alone would hardly appear to be of specific value, but since no intermediate specimens are known the name may be retained.

13. *Psammisia killipii* A. C. Smith, sp. nov.

Frutex parvus; laminis late ovatis basi subcordatis apice acutis 7 ad 9 pli-nerviis; inflorescentia racemosa glabra; floribus longe pedicellatis; calyce campanulato, limbo tubum subaequante; corolla late conica; staminibus aequalibus, filamentis crassis in connectiva crassa bicalcarata ducentibus, tubulis subcoriaceis connatis vel distinctis quam loculis multo brevioribus.

Low shrub in thickets; branchlets subterete, castaneous, glabrous; petioles subterete, slightly angled, 5 to 7 mm. long, glabrous; leaf blades broadly ovate, 10 to 14 cm. long, 6 to 9 cm. broad, subcordate at base, acute at apex, entire or shallowly crenate at margins, glabrous, 7 to 9 pli-nerved, the secondary nerves oriented slightly above base, arcuate-ascending, with the midnerve slightly impressed or nearly plane above, prominent beneath, the veinlets copiously reticulate, raised on both surfaces; inflorescence axillary, racemose, 8 to 12 flowered, glabrous in all parts; rachis subterete, 2.5 to 4 cm. long; pedicels

²⁵ Lechl. Berb. Amer. Austr. 58. 1857.

striate, stout, 18 to 35 mm. long, each subtended by an oblong acute bractlet 3 to 4 mm. long, bibracteolate near base, swollen distally; calyx tube broadly campanulate, 4 to 5 mm. long, about 6 mm. in diameter at summit at anthesis; limb 3 to 4 mm. long including lobes, the lobes ovate, apiculate, about 2 mm. long; corolla broadly conical, 17 to 20 mm. long, 8 to 9 mm. in diameter near base, contracted to about 3 mm. in diameter at throat, the lobes 2.5 mm. long; stamens 10, 9 to 11 mm. long; filaments stout, coherent at base, dark castaneous, glabrous, about 4.5 mm. long, leading into thick connectives which are continued up the tubules dorsally, the connectives 2-spurred, alternately narrower and more noticeably spurred (spurs about 2 mm. across, connectives immediately below them about 1.5 mm. across); anther sacs stout, about 7 mm. long; tubules laterally connate or partially distinct, about 2 mm. long, opening by introrse clefts their whole length; style about as long as corolla, the stigma subhemispherical.

Type in the herbarium of the New York Botanical Garden, collected in low thicket ("machimbi") at Cuatro Esquinas, Department of El Cauca, Colombia, altitude 1,700 to 1,800 meters, June 5, 1922, by F. W. Pennell and E. P. Killip (no. 6324).

DISTRIBUTION: Known only from the type collection.

The flowers of this species approach those of *P. grandiflora* in girth, but they are shorter and the species differs markedly in other points. The tubules of the anthers, which are unusually short, appear to consist of the same dark castaneous coriaceous tissue as the filaments and connectives. Each anther thus seems to be fitted with a callose cap and presents an appearance not to be confused with that of any other species. The many-nerved subcordate-based leaves are also distinctive.

14. *Psammisia recurvata* Britton, Bull. Torrey Club 48: 335. 1921.

Subscandent shrub; branchlets stout, terete, brownish, glabrous; pedicels stout, rugose, 12 to 18 mm. long, glabrous, narrowly winged above; leaf blades thick-coriaceous, broadly ovate-oblong, 15 to 30 cm. long, 10 to 13 cm. broad, cuneate or subattenuate at base, long-acuminate at apex, subentire or shallowly crenate at margins, glabrous, 7 to 9 pli-nerved, the secondary nerves oriented slightly above base, arcuate-ascending, with the midnerve impressed above, prominent beneath, the veinlets reticulate, plane above, slightly raised beneath; inflorescence axillary, short-racemose, 5 to 12 flowered, glabrous in all parts; rachis stout, subterete, 10 to 25 mm. long; pedicels striate, 20 to 40 mm. long, each subtended by a deciduous oblong acute bractlet 3 to 4 mm. long, minutely bibracteolate near base; calyx tube (past maturity) short-cylindric or subspherical, about 5 mm. long and 4 mm. in diameter; limb about 6 mm. long including lobes, the lobes ovate, apiculate, about 2 mm. long; corolla not seen; stamens 10 (?); filaments thick, nigrescent, firmly connate, incomplete in our specimen but probably about 3 mm. long, leading into narrow connectives, the connectives glabrous, alternately slightly 2-spurred; anther sacs about 5 mm. long; tubules narrowly cylindric, 3.5 to 4 mm. long, opening by oval clefts about half their length; style 25 to 30 mm. long, the stigma peltate; fruit spherical, up to 15 mm. in diameter, the calyx limb decurrent.

TYPE LOCALITY: Mount Tocuche, Trinidad. Type collected by Britton, Hazen, and Mendelson (no. 1294).

DISTRIBUTION: Mountains of Trinidad.

TRINIDAD: *Crüger* 1709 (N). Mount Tocuche, *Britton, Hazen and Mendelson* 1294 (N, Y, type). Morne Bleu, *Broadway* 6211 (K). Heights of Aripo, *Broadway* 7121 (K, N).

Notable in its robust habit and large many-nerved cuneate-based leaves. The calyx lobes are often in a state of semifusion. In the original description the corolla is described as "about 4 cm. long, red, the short limb white," but in the type specimen no corolla is available. Three imperfect stamens are present, which were not mentioned in the original description.

15. *Psammisia elegans* Rusby, *Descr. S. Amer. Pl.* 78. 1920.

Subscandent shrub, 8 to 12 meters high; branchlets terete, violaceous or cinereous, glabrous; petioles subterete, glabrous, nigrescent, 8 to 10 mm. long; leaf blades broadly ovate or oblong-ovate, 12 to 20 cm. long, 6 to 11 cm. broad, abruptly cuneate at base, caudate-acuminate at apex, entire at margins, glabrous, 7 to 9 pli-nerved, the secondary nerves oriented near base, with the midnerve slightly impressed above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary near ends of branchlets, short-racemose, glabrous in all parts, 8 to 15 flowered; rachis subterete, 8 to 20 mm. long; pedicels striate, 25 to 40 mm. long, each subtended by a triangular bractlet about 2 mm. long, minutely bibracteolate below middle, swollen distally; calyx tube slightly rugose, campanulate, 3.5 to 4 mm. long and 4 mm. in diameter at anthesis; limb 4 to 5 mm. long including lobes, the lobes 3, 4, or 5, often in a state of semifusion, ovate, apiculate, 2 to 3 mm. long; corolla subcylindric, 20 to 27 mm. long, 5 to 7 mm. in diameter near base, contracted at throat, the lobes about 2 mm. long, reflexed when mature; stamens 10 to 12 mm. long; filaments dark castaneous, distinct, glabrous, 3 to 5 mm. long, leading into slender connectives, the connectives alternately 2-spurred, the spurs subacute, slightly broader than the connective immediately below; anther sacs 5 to 6 mm. long; tubules about 3 mm. long; stigma truncate.

TYPE LOCALITY: Las Nubes, Santa Marta Mountains, Department of Magdalena, Colombia, altitude about 1,400 meters. Type collected by H. H. Smith (no. 1554).

DISTRIBUTION: Known only from the type collection.

COLOMBIA.

MAGDALENA: Las Nubes, Santa Marta Mountains, *H. H. Smith* 1554 (F, N, Y, type).

Probably most closely related to the preceding, from which it differs markedly by the thinner leaves, which are more rounded at the base, and by the distinct filaments. The calyx lobes are commonly reduced in number.

16. *Psammisia sodiroi* Hoer. *Bot. Jahrb. Engler* 42:306. 1909.

Shrub; branchlets subterete, often striate, brownish, glabrous; petioles subrugose, subterete, often nigrescent, 5 to 8 mm. long; leaf blades oblong or ovate-oblong, 13 to 25 cm. long, 5 to 9 cm. broad, broadly cuneate at base, long-acuminate at apex, entire and slightly revolute at margins, glabrous, pinnate-veined, the midvein stout, nearly plane above, very prominent beneath, the secondary veins 4 to 6 to a side, spreading, connected near margins, nearly plane above, prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces; inflorescence axillary, subfasciculate or short-racemose (rachis stout, not more than 5 mm. long), glabrous in all parts, 6 to 20 flowered; pedicels subrugose, 10 to 15 mm. long, each subtended by an oblong bract 2 to 3 mm. long, minutely bibracteolate near middle; calyx tube campanulate, subnigrescent, 2 to 2.5 mm. long, about 4 mm. in diameter at anthesis; limb about 3 mm. long including lobes, the lobes 5, ovate, acute, about 2 mm. long and 3 mm.

broad, slightly thickened at margins; corolla cylindric-conical, 11 to 13 mm. long, about 5 mm. in diameter near base, the lobes 2 mm. long; stamens about 7 mm. long; filaments subnigrescent, loosely coherent at base, sparsely pilose at margins, about 2 mm. long, leading into broad connectives, the connectives 2-spurred, the spurs alternately subacute and rounded; anther sacs sharply incurved at base, 3 to 4 mm. long; tubules cylindric, narrowed, about 3 mm. long; stigma truncate.

TYPE LOCALITY: Nanegal Valley, Province of Pichincha, Ecuador. Type collected by Sodiro (no. 92/4b).

DISTRIBUTION: Andes of northern Ecuador and southern Colombia.

COLOMBIA: *André* (K).

NARIÑO: San Pablo, *André* 3333 (K).

ECUADOR: Mindo Valley, *Sodiro* 92/12 (B).

PICHINCHA: Nanegal Valley, *Sodiro* 92/4b (B, type). Mount Pichincha, about 2,500 meters, *Jameson* 622 (K, N). Pululague, Quito, 2,300 to 2,700 meters, *Lehmann* 5439 (K). Niebli, *André* 3793 (K).

Marked from all other members of the genus by its numerous secondary nerves. The short corollas also are characteristic.

17. *Psammisia columbiensis* Hoer. Bot. Jahrb. Engler 42:303. 1909.

Slender shrub; branchlets stramineous, striate, glabrous; petioles rugose, glabrous, subnigrescent, 4 to 6 mm. long; leaf blades oblong, 9 to 12 cm. long, 2.5 to 3.5 cm. broad, cuneate at base, obtusely long-acuminate at apex, entire at margins, essentially glabrous, 5-ply-nerved, the secondary nerves oriented near base, ascending, with the midnerve slightly impressed above, prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces; inflorescence axillary near ends of branchlets, racemose, essentially glabrous in all parts, 8 to 12 flowered; rachis striate, subterete, 5 to 6 cm. long; pedicels striate, slender at base, 20 to 33 mm. long, each subtended by an oblong bract about 2 mm. long, bibracteolate near middle, swollen distally; calyx tube rugose, campanulate, 2.5 to 3 mm. long, about 3 mm. in diameter at anthesis; limb 3 mm. long including lobes, the lobes 5, ovate, apiculate, 2.5 mm. long and 3 mm. broad, often thickened at margins; corolla subcylindric, often falcate, 20 to 27 mm. long, about 6 mm. in diameter at base, contracted at the long throat, the lobes oblong, about 2 mm. long; stamens about 13 mm. long; filaments castaneous, firmly connate in a tube, sparsely pilose at distal margins, about 4 mm. long, leading into slender connectives, the connectives alternately 2-spurred, the spurs subacute, slightly broader than the connective immediately below; anther sacs 6.5 mm. long; tubules subcylindric, distinct or coherent at base, 4.5 mm. long; stigma truncate or subpeltate.

TYPE LOCALITY: Central Andes of Popayán, Department of El Cauca, Colombia, altitude 2,500 to 2,800 meters. Type collected by Lehmann (no. 4452).

DISTRIBUTION: Known only from the type collection.

COLOMBIA.

EL CAUCA: Central Andes of Popayán, *Lehmann* 4452 (B, type).

The present species is of dubious affinity but is probably most closely related to *P. falcata* or *P. lanceolata*, from which it is distinguished by the connate filaments and slender habit.

18. *Psammisia macrophylla* (H. B. K.) Klotzsch, Linnaea 24:45. 1851.

Thibaudia macrophylla H. B. K. Nov. Gen. & Sp. 3:270. 1818.

Spreading shrub 2 to 6 meters high; branchlets terete, with a glabrous deciduous reddish brown bark; petioles subcylindric, terete, 5 to 10 mm. long,

glabrous; leaf blades oblong or lanceolate-oblong, 15 to 35 cm. long, 3 to 11 cm. broad, truncate or broadly cuneate at base, long-acuminate at apex, entire at margins, glabrous, dull olivaceous above, reddish brown beneath, 5 to 7 plinerved, the secondary nerves oriented slightly above base, with the midnerve impressed above, prominent beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary, short-racemose, essentially glabrous in all parts, 10 to 25 flowered; rachis subterete, dark castaneous, stout, 2 to 4 cm. long; pedicels subterete, lightly striate, 18 to 40 mm. long, 5 to 10 per centimeter of rachis, each subtended by a subcoriaceous oblong bractlet about 2 mm. long, minutely bibracteolate near base; calyx tube broadly campanulate, 5 to 6 mm. long, about 6 mm. in diameter at summit at anthesis; limb thick-coriaceous, 4 to 7 mm. long including lobes, the lobes usually 5 (often 3 or 4, in a state of semifusion), ovate, apiculate, 2 to 4 mm. long; corolla subcylindric or elongate-urceolate, 22 to 30 mm. long, about 7 mm. in diameter at base, contracted to the long throat, the lobes oblong, 2.5 to 5 mm. long; stamens 8 to 12 mm. long; filaments dark castaneous, distinct, glabrous, 3 to 4 mm. long, leading into more slender connectives, the connectives 2-spurred, alternately narrower and more obviously spurred, the spurs subacute, anther sacs 5 to 6 mm. long; tubules distinct to base or frequently laterally connate, 2.5 to 4.5 mm. long; style slightly exerted in mature flowers, the stigma truncate; fruit subspherical, 10 mm. or more in diameter, the broad coriaceous calyx limb persistent.

TYPE LOCALITY: Andes of Popayán, Department of El Cauca, Colombia, altitude about 2,000 meters. Type collected by Humboldt and Bonpland.

DISTRIBUTION: Andes of southern Colombia, altitude 1,400 to 2,700 meters.

COLOMBIA: *Lehmann* K180 (K). Capilla, *Lehmann* BT965 (K, Y).

TOLIMA (?): Quindío Andes, *Humboldt & Bonpland* (B).

CALDAS: Santuario, *Pennell* 10308 (Y), 10315 (Y).

EL VALLE: La Cumbre, *Pennell & Killip* 5751 (B, N, Y).

EL CAUCA: Popayán and vicinity, *Triana* 2669 (B, K); *Lehmann* 8417 (F, G, N), BT439 (Y), BT639 (K, Y); *Hartweg* 1216 (B, K, Y); *Pennell & Killip* 6369 (N, Y), 8130 (Y), 8275 (N, Y), 8305 (N, Y); *Pennell* 8267 (N, Y).

NARIÑO: Alto de Arardo, *Triana* 2674 (B).

This species evidently is limited in geographic range to the Central and Western Cordillera of southern Colombia. It is often confused with *P. falcata*, but may be distinguished by its strictly glabrous fleshy filaments. It may also be noted that the racemes are comparatively short, with crowded flowers.

19. *Psammisia guianensis* Klotzsch, *Linnaea* 24: 43. 1851.

Psammisia leucostoma Benth.; Meissn. in Mart. Fl. Bras. 7: 127. 1863.

Chupalon guianense Kuntze, Rev. Gen. Pl. 2: 384. 1891.

Chupalon leucostomum Kuntze, Rev. Gen. Pl. 2: 384. 1891.

Psammisia ulei Hoer. Verh. Bot. Ver. Brand. 50: 92. 1909.

Shrub; branchlets terete, slender, glabrous, brownish, sometimes puberulous when very young; petioles subterete, 5 to 12 mm. long, essentially glabrous; leaf blades oblong or lanceolate-oblong, 10 to 22 cm. long, 3 to 7 cm. broad, truncate at base, acuminate at apex, subentire and slightly revolute at margins, 5-plinerved, the secondary nerves oriented above base, ascending, with the midnerve impressed above, prominent beneath, the veinlets reticulate, slightly raised or nearly plane on both surfaces; inflorescence axillary, short-racemose, essentially glabrous in all parts, 8 to 20 flowered; rachis subterete, 7 to 20 mm. long; pedicels slightly rugose, sometimes subflexuose, 15 to 25 mm. long, each

subtended by a triangular bractlet about 1.5 mm. long, minutely bibracteolate below middle; calyx tube campanulate, 2 to 4 mm. long and about 3 mm. in diameter at anthesis; limb 2 to 5 mm. long including lobes, the lobes 3, 4, or 5, often in a state of semifusion, ovate, apiculate, 1 to 3 mm. long; corolla subcylindric or elongate-urceolate, 18 to 27 mm. long, about 5 mm. in diameter near base, contracted to the long throat, the lobes oblong, 2 to 4 mm. long; stamens 9 to 12.5 mm. long; filaments dark castaneous, distinct or slightly coherent at base, 3 to 5 mm. long, slightly pilose marginally distally, leading into long slender connectives, the connectives alternately 2-spurred (sometimes all spurred, but the alternate ones more slender and more obviously spurred), the spurs subacute; anther sacs 5 to 6 mm. long; tubules distinct or laterally connate toward base, about 3 mm. long; stigma truncate; fruit subspherical, up to 12 mm. in diameter, surmounted by the broad coriaceous calyx limb.

TYPE LOCALITY: Mount Roraima, British Guiana. Type collected by Schomburgk (no. 974).

DISTRIBUTION: Mount Roraima in British Guiana; also at low elevations on the eastern Andean slope from Colombia to Bolivia; altitude 500 (or less ?) to 1,500 meters.

BRITISH GUIANA: Mount Roraima, *Schomburgk* 974 (B, type, K); *im Thurn* 49, in part (K, N).

BRAZIL.

AMAZONAS: Panuré, Rio Uaupes, *Spruce* 2465 (G, K, type of *P. leucostoma*, Y), 2705 (K).

COLOMBIA.

PUTUMAYO: Umbría, 325 meters, *Klug* 1678 (N, Y).

ECUADOR.

TUNGURAGUA: Baños, Río Pastaza, *Spruce* 5036 (G, K, Y).

PERU: Maclean (K).

SAN MARTÍN: Tarapoto, *Spruce* 4357 (K). Cerro de Escalero, *Ule* 6340 (B, type of *P. ulei*). San Roque, *L. Williams* 7343 (Y), 7712 (F, Y).

LORETO: Mouth of Río Santiago, *Tessmann* 3954 (B).

HUÁNUCO: Cueva Grande, *Macbride* 4792 (F).

BOLIVIA.

LA PAZ: Mapiri and vicinity, *Rusby* 2038 (F, N, Y); *Buchtien* 1179 (B), 1180 (B, N, Y), 1181 (B, N).

This species has a very wide and unusual distribution for a member of the tribe, but it is observable in many cases that species inhabiting the eastern slopes of the Andes have a far wider distribution than those of the western ranges. In the latter case the mountains are sharply dissected, and often a narrow valley is sufficiently deep to prohibit the spread of a species. On the other hand, the mountains of the eastern Andes are less rugged, and the streams are larger and interconnected by virtue of the Amazon. Possibly this geographic fact accounts for the wide distribution of such species as the present one and *Satyria panurensis*, whereas the species of northwestern Colombia, for example, where the mountains are sharply dissected, are greatly restricted in range.

Among the types here concerned there is little difference. The type of *P. leucostoma* is slightly the slenderest in habit, and another specimen from the Rio Uaupes, *Spruce* 2705, has extraordinarily narrow leaves. The widest leaves are those of the Tessmann specimen, but I am convinced that these forms are no more than extremes in a naturally variable species. This species is possibly more closely related to *P. pauciflora* and *P. urichiana* than is indicated by the key.

20. *Psammisia coarctata* (R. & P.) A. C. Smith.*Thibaudia coarctata* R. & P. Fl. Peruv. Chil. 4: pl. 385. 1802.*Thibaudia bicolor* R. & P.; DC. Prodr. 7: 561. 1839.*Psammisia bicolor* Klotzsch, Linnaea 24: 44. 1851.*Vaccinium bicolor* F. Muell. Sel. Pl. Indust. Cult. 249. 1876.*Psammisia engleriana* Hoer. Bot. Jahrb. Engler 42: 304. 1909.*Psammisia urbaniana* Hoer. Bot. Jahrb. Engler 42: 307. 1909.*Psammisia weberbaueri* Hoer. Bot. Jahrb. Engler 42: 307. 1909.

Shrub, often subscandent; branchlets stout, subterete, glabrous, brownish or cinereous; petioles subterete, 6 to 10 mm. long, glabrous; leaf blades oblong or ovate-oblong, 10 to 20 cm. long, 3 to 7 cm. broad, cuneate at base, acuminate at apex, subentire or shallowly crenate towards apex, glabrous, 5 to 7 pli-nerved, the secondary nerves oriented near base, with the midnerve slightly impressed above, prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces; inflorescence axillary, short-racemose, glabrous in all parts, 10 to 20 flowered; rachis subterete, stout, up to 5 mm. in diameter, 1 to 3 cm. long, conspicuously marked with the scars of deciduous pedicels; pedicels striate, 20 to 45 mm. long, each subtended by an oblong bractlet about 4 mm. long, minutely bibracteolate near base, swollen distally; calyx tube broadly campanulate, 2 to 4 mm. long and 4 to 6 mm. in diameter at anthesis; limb 2.5 to 4 mm. long including lobes, the lobes 5, ovate, apiculate, about 1.5 mm. long, thick-margined; corolla cylindric-urceolate, 18 to 27 mm. long, about 8 mm. in diameter near base, contracted to throat, deciduously sparsely brown-pilose without at middle, the lobes 1.5 to 2 mm. long; stamens 10 to 13 mm. long; filaments castaneous, distinct, slightly pilose at margins distally with hairs up to 0.3 mm. long, leading into long slender connectives, the connectives alternately 2-spurred (sometimes spurred on one margin only), the spurs acute, distinct; anther sacs 6 to 8 mm. long; tubules 3 to 4 mm. long.

TYPE LOCALITY: Peru, probably in Department of Huánuco. Type collected by Ruiz and Pavon.

DISTRIBUTION: Eastern Andes of central and southern Peru, altitude 1,600 to 2,400 meters.

PERU: *Macleay* (K); *Mathews* 2078 (K, in part).

HUÁNUCO: Near Monson, *Weberbauer* 3510 (B, type of *P. engleriana*).

Pampayacu, *Sawada* P36 (F).

JUNÍN: Huacapistana, *Weberbauer* 2151 (B, type of *P. weberbaueri*);

Killip & Smith 24138 (N, Y). Schunke Hacienda, San Ramón, *Macbride* 5626 (F).

Cuzco: Sandía, *Weberbauer* 1159 (B, type of *P. urbaniana*).

The necessity of forming a new combination for this species and at the same time reducing so many names is regrettable but inevitable. The name *Thibaudia bicolor* was not published in the fourth volume of Ruiz and Pavon, as was *Thibaudia coarctata*. In making his choice between the two names, Dunal evidently had access to some unpublished manuscript. The three types of Hoerold's species here involved differ from one another only in very minor points. As represented by the above-cited specimens, the species is a very coherent one.

21. *Psammisia falcata* (H. B. K.) Klotzsch, Linnaea 24: 44. 1851.*Thibaudia falcata* H. B. K. Nov. Gen. & Sp. 3: 269. 1818.*Thibaudia cyathifera* Benth. Pl. Hartw. 222. 1846.*Psammisia cyathifera* Klotzsch, Linnaea 24: 43. 1851.

Shrub; branchlets subterete, glabrous, brownish; petioles rugose, glabrous, narrowly winged above, 5 to 15 mm. long; leaf blades oblong or lanceolate-oblong, sometimes falcate, 12 to 35 cm. long, 3.5 to 7 cm. broad, cuneate at base, acuminate at apex, subentire or shallowly crenate or subserrate toward apex, glabrous, 5 to 7 pli-nerved (or somewhat pinnate-nerved), the secondary nerves oriented above base, ascending, with the midnerve slightly impressed above, raised beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary, racemose, essentially glabrous, 10 to 20 flowered; rachis subterete, stout, 3 to 9 cm. long; pedicels striate, 18 to 40 mm. long, each subtended by an oblong coriaceous bractlet about 4 mm. long, minutely bibracteolate near base; calyx tube short-cylindric or campanulate, about 4 mm. long and 5 mm. in diameter at anthesis; limb coriaceous, 3 to 5 mm. long including lobes, the lobes 5, ovate, apiculate, about 1 mm. long; corolla subcylindric, often slightly falcate, 18 to 28 mm. long, 6 mm. in diameter near base, contracted to about 3 mm. in diameter at throat, the lobes oblong, subacute, about 1.5 mm. long; stamens 12 to 16 mm. long; filaments dark castaneous, distinct, 4 to 6 mm. long, distally pilose at margins with a few straight pale hairs up to 0.6 mm. long, leading into slender connectives, the connectives alternately 2-spurred, the spurs subacute; anther sacs 8 to 9 mm. long; tubules subcylindric, 3 to 5 mm. long; style exserted, the stigma truncate; fruit subspherical, slightly rugose, up to 12 mm. in diameter, surmounted by the broad coriaceous calyx limb.

TYPE LOCALITY: Amalguer, Colombia, altitude about 3,200 meters. Type collected by Humboldt and Bonpland.

DISTRIBUTION: Eastern Cordillera of Colombia, altitude 1,800 to 3,500 meters.

COLOMBIA: *Purdie* (K).

SANTANDER: La Baja, *Killip & Smith* 17174 (N, Y), 18370 (N, Y), 18794 (N, Y).

CUNDINAMARCA: Bogotá, *Schultze* 70 (B, N). Cincha, *Triana* 2685 (K).

Pasca, *Triana* 2686 (B, K). Tequendama, *Holton* 633 (K, N); *Triana*, in March, 1856 (B). Eastern páramos of Guasca, toward Gachetá, *Ariste Joseph B.* 113 (N, Y).

HUILA: East of Neiva, *Rusby & Pennell* 865 (N, Y).

Well marked by its comparatively long rachis and distant long-pedicelled flowers. It is frequently confused with *P. macrophylla*, yet the differences suggested by the key are constant and the ranges of the two species do not seem to overlap.

22. *Psammisia lanceolata* Hoer. Bot. Jahrb. Engler 42: 309. 1909.

Shrub; branchlets terete, cinereous, densely pubescent with pale spreading hairs up to 0.3 mm. long; petioles subcylindric, 5 to 15 mm. long, pubescent as the branchlets, becoming glabrous; leaf blades lanceolate-oblong, 10 to 22 cm. long, 3 to 7 cm. broad, cuneate or truncate at base, acute or acuminate at apex, entire and slightly revolute at margins, 5 to 7 pli-nerved or pinnate-veined with the secondary veins oriented in basal half, the secondary nerves 3 or 4 to a side, ascending, with the midvein impressed above, prominent beneath, the veinlets reticulate, nearly plane on both surfaces, essentially glabrous above, puberulous beneath when young, becoming glabrous; inflorescence axillary, racemose, 8 to 20 flowered; rachis subterete, 2 to 5 cm. long, when young closely pubescent as the branchlets, glabrescent; pedicels subterete, 20 to 30 mm. long, densely puberulous with pale brown hairs about 0.2 mm. long or subglabrous, each subtended by a deciduous bractlet, bibracteolate near base

with triangular acute bractlets about 2 mm. long, swollen distally; calyx tube short-cylindric or subspherical, pilose with spreading scattered hairs about 0.3 mm. long, about 4 mm. long, 5 to 6 mm. in diameter at anthesis; limb spreading, 4 to 6 mm. long including lobes, the lobes 4 or 5 (rarely 3), often in a state of semifusion, ovate, apiculate, 2 to 4 mm. long, 5 to 6 mm. across; corolla subcylindric, 20 to 28 mm. long, about 7 mm. in diameter, contracted above, the lobes 3 to 4 mm. long, reflexed when mature; stamens 12 to 14 mm. long; filaments nigrescent, distinct, 4 to 6 mm. long, distally pilose at margins with hairs up to 0.5 mm. long, leading into long slender connectives, the connectives alternately 2-spurred (spurs acute, about 1.3 mm. across, connective 0.5 mm. across immediately below), the alternate connectives slightly broader; anther sacs 7 to 8.5 mm. long; tubules elongate-conical, 3 to 4 mm. long; style exerted in mature flowers, the stigma truncate; fruit subspherical, glabrous, up to 15 mm. in diameter, the calyx limb decurrent.

TYPE LOCALITY: Pasca, Department of Cundinamarca, Colombia, altitude 2,700 meters. Type collected by Triana (no. 4333/19).

DISTRIBUTION: Eastern Cordillera of Colombia, altitude 1,800 to 2,700 meters.

COLOMBIA: Barroblanco, *André* 1337 (K), 1340 (K), 1498 (K).

CUNDINAMARCA: Pasca, *Triana* 4333/19 (B, type). Fusagasugá, *Pennell* 2705 (N, Y).

HUILA: East of Neiva, *Pennell* 599 (Y), 875 (N, Y).

This species is closely related to the preceding, from which it differs only in the presence of somewhat persistent hairs. The young fruits are subglabrous, and the use of so variable a character as pubescence for specific limitation in this group is perhaps not justified.

23. *Psammisia penduliflora* (Dun.) Klotzsch, *Linnaea* 24: 43. 1851.

Thibaudia penduliflora Dun.; DC. *Prodr.* 7: 562. 1839.

Psammisia planchoniana Decaisne, *Rev. Hort.* IV. 3: 182. 1854.

Chupalon penduliflorum Kuntze, *Rev. Gen. Pl.* 2: 383. 1891.

Macleania kalbreyeri Mansf. *Notizbl. Bot. Gart. Berlin* 9: 435. 1925.

Shrub or low tree, 2 to 6 meters high; branchlets subterete, dark brown, puberulous when young, becoming glabrous; petioles subterete, 3 to 10 mm. long, essentially glabrous, narrowly winged above; leaf blades oblong or ovate-oblong, 7 to 17 cm. long, 3 to 7 cm. broad, cuneate at base, caudate-acuminate at apex, entire at margins, glabrous above, pilose beneath (hairs dark brown, stout, appressed, 0.2 to 0.3 mm. long, averaging 2 to 4 per square millimeter of surface), 5 (rarely 7) pli-nerved, the secondary nerves oriented near base, ascending, with the midnerve impressed above, prominent beneath, the veinlets reticulate, plane above, slightly raised beneath; inflorescence axillary, racemose, 4 to 12 flowered; rachis subterete, slightly rugose, 1 to 3 cm. long (rarely 5 cm.) at maturity; pedicels striate, 8 to 15 mm. long, glabrous, each subtended by an oblong bractlet 3 to 5 mm. long, deciduously bibracteolate near middle with similar bractlets; calyx tube subcylindric or subspherical, puberulous with minute silky hairs or glabrous, 2 to 3 mm. long and about 2 mm. in diameter at anthesis; limb 2.5 to 5 mm. long including lobes, the lobes 4 or 5 (sometimes 3), ovate, apiculate, 2 to 4 mm. long; corolla subcylindric, 16 to 23 mm. long, about 4 mm. in diameter, gradually contracted distally, glabrous or minutely puberulous distally, the lobes oblong, 2 to 3 mm. long; stamens 8 to 11 mm. long; filaments dark castaneous, distinct, distally puberulous or glabrous, 2 to 3 mm. long, leading into slender connectives, the connectives alternately 2-spurred, the spurs inconspicuous, rounded or subacute; anther sacs 4 to 6 mm. long; tubules distinct or coherent at base.

elongate-conical, 2 to 4 mm. long, opening by oval clefts of varying length; style about as long as corolla or slightly exserted, the stigma truncate; fruit subspherical, up to 15 mm. in diameter, the calyx limb decurrent.

TYPE LOCALITY: Caracas, Federal District, Venezuela. Type collected by Vargas.

ILLUSTRATIONS: Hook. Bot. Mag. Curtis 86: pl. 5204. 1860. Decaisne, Rev. Hort. IV. 3: pl. 1. 1854.

DISTRIBUTION: Andes of western Venezuela and northeastern Colombia, altitude 1,000 to 2,800 meters.

VENEZUELA.

FEDERAL DISTRICT: Caracas, *Linden* 283 (K).

MÉRIDA: *Moritz* 1347 (B, K), 1347b (B, G); *Schuchardt* (B). Between Tabay and Mucurubá, *Pittier* 12874 (N). Aricagua, *Jahn* 985 (N).

COLOMBIA: *Triana* 345 (B).

MAGDALENA: Santa Marta Mountains, *Purdie* (K, 5 collections).

NORTE DE SANTANDER: Ocaña, *Kalbreyer* 286 (B, type of *Macleania kalbreyeri*, K). Toledo, *Killip & Smith* 20051 (N, Y), 20108 (N, Y), 20481 (N, Y), 20587 (N, Y).

SANTANDER: Mesa de los Santos, *Killip & Smith* 15049 (N, Y), 15108 (N, Y). Suratá, *Killip & Smith* 16621 (N). La Baja, *Killip & Smith* 16777 (N, Y), 18013 (N, Y). California, *Killip & Smith* 17873 (Y). Charta, *Killip & Smith* 18868 (N, Y), 18872 (N, Y), 19099 (N, Y).

This is a very common species throughout its rather limited range, and is easily identified by the stout brown hairs on the lower surface of leaves. The corollas are sometimes sparsely pubescent, but this character is neither constant nor persistent. The fact that spurs are often nearly lacking on the connectives indicates the close relationship of this species to *Macleania*. A local name in Mérida is "coral."

24. *Psammisia hookeriana* Klotzsch, *Linnaea* 24: 46. 1851.

Thibaudia pichinchensis var. *glabra* Hook. Bot. Mag. Curtis 73: pl. 4344. 1847.

Psammisia towarensis Klotzsch, *Linnaea* 24: 44. 1851.

Psammisia sarcantha Decaisne, Rev. Hort. IV. 3: 181. 1854.

Thibaudia sarcantha Hook. f. Bot. Mag. Curtis 90: pl. 5450. 1864.

Thibaudia jessicae Hook. f. Bot. Mag. Curtis 91: pl. 5547. 1865.

Macleania towarensis Hoer. Bot. Jahrb. Engler 42: 269. 1909.

Psammisia jessicae Hoer. Bot. Jahrb. Engler 42: 270. 1909.

Subscandent shrub, the branches 2 to 6 meters long; branchlets terete, brownish, glabrous; petioles subterete, glabrous, 5 to 12 mm. long; leaf blades broadly ovate or ovate-oblong, 12 to 25 cm. long, 5 to 9 cm. broad, cuneate at base, acuminate or long-acuminate at apex, entire at margins, thick-coriaceous, 5 to 7 pli-nerved, the secondary nerves oriented above base, with the mid-nerve impressed or nearly plane above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary, short-racemose, essentially glabrous in all parts, 8 to 20 flowered; rachis slightly rugose, about 1 cm. long; pedicels subterete, slightly striate, 10 to 22 mm. long, each subtended by a subcoriaceous ovate bractlet about 1.5 mm. long, minutely bibracteolate near base; calyx tube short-subcylindric or broadly campanulate, about 3 mm. long and 3 to 4 mm. in diameter at anthesis; limb spreading, 2 to 4 mm. long including lobes, the lobes 4 or 5, ovate, apiculate, 1 to 3 mm. long; corolla subcylindric or cylindric-urceolate, 14 to 16 mm. long (rarely 12 mm.), 5 to 6 mm. in diameter at base, contracted to the

short throat, 5 (rarely 4) lobed, the lobes oblong, acute, 2 to 3 mm. long; stamens 10 (rarely 8), 8 to 10 mm. long; filaments nigrescent, distinct, glabrous or short-pilose distally at margins, leading into slender connectives, the connectives 2-spurred, alternately narrower, the spurs rounded or sub-acute, frequently obscure; anther sacs 4 to 6 mm. long; tubules distinct or laterally connate at base, 2 to 3.5 mm. long, opening by oval clefts about half their length; stigma peltate; fruit subspherical, 1 cm. or more in diameter, surmounted by the broad coriaceous calyx limb.

TYPE LOCALITY: Mountains of Colombia. Type collected by Purdie.

DISTRIBUTION: Andes of Venezuela and northeastern Colombia.

COLOMBIA: *Purdie* (K, type).

VENEZUELA.

FEDERAL DISTRICT: Caracas, *Linden* 26 (K). Silla de Caracas, *Kuntze* 1636 (N, Y). Altos de Galipán, 1,800 meters, *Pittier* 9916 (N); *E. Pittier* 129 (N, Y).

MÉRIDA: *Moritz* 479 (B). Colonia Tovar, *Moritz* 772 (B, type of *P. towarensis*); *Fendler* 737 (G, K, Y); *Allart* 399 (B, N, Y).

CULTIVATED PLANT: Originally from Caracas? (K, type of *Thibaudia jessicae*).

A beautiful species, cultivated in Europe, and probably most closely allied to *P. penduliflora*, from which it is easily distinguished by the lack of pubescence on the leaves and by the small bractlets.

25. *Psammisia ulbrichiana* Hoer. Bot. Jahrb. Engler 42:306. 1909.

Subscandent shrub; branchlets terete, reddish brown and slightly puberulous when young, becoming glabrous, with deciduous cinereous bark; petioles rugose, stout, 10 to 18 mm. long, glabrous, winged above; leaf blades oblong or lanceolate-oblong, 18 to 40 cm. long, 6 to 10 cm. broad, cuneate at base, long-acuminate at apex, subentire at margins, glabrous, dull olivaceous above, olivaceous or reddish beneath, usually 7-plexi-nerved, the secondary nerves oriented above base, with the midnerve impressed above, prominent beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary, short-racemose, glabrous, 10 to 30 flowered; rachis stout, 1 to 2 cm. long; pedicels striate, 20 to 45 mm. long, each subtended by an oblong subcoriaceous bractlet about 3 mm. long, minutely bibracteolate below middle, swollen distally; calyx tube campanulate, 2.5 to 4 mm. long, 4 to 6 mm. in diameter at anthesis; limb subcoriaceous, about 4 mm. long including lobes, the lobes 5, ovate, apiculate, about 2 mm. long; corolla subcylindric, 18 to 25 mm. long, 5 to 6 mm. in diameter near base, contracted at throat, often conspicuously jointed slightly above middle, the lobes oblong, 2 to 3 mm. long; stamens 9 to 12 mm. long; filaments nigrescent, distinct or slightly coherent at base, sparsely pilose at margins distally (hairs about 0.3 mm. long), leading into slender connectives, the connectives alternately 2-spurred, the spurs rounded, obscure, sometimes lacking; anther sacs 4 to 6.5 mm. long; tubules laterally connate in basal half, 2.5 to 5 mm. long, cylindric-conical; stigma peltate.

TYPE LOCALITY: Mount Pululagua, Province of Pichincha, Ecuador. Type collected by Sodiro (no. 92/4).

DISTRIBUTION: Andes of Ecuador and Peru, altitude 1,000 to 3,300 meters.

ECUADOR.

PICHINCHA: Mount Pululagua, *Sodiro* 92/4 (B, type). Cauzacoto, *Sodiro* 92/5 (B).

EL ORO: Between La Chorita and Portovelo, *Hitchcock* 21194 (N, Y).

AZUAY: Cuenca, *Pearce* 236 (K).

PERU: *Mathews*, in 1862 (Y).

AMAZONAS: Central Cordillera, *L. Williams* 7597 (F, N).

HUÁNUCO: Cushi, *Macbride* 4851 (F).

JUNÍN: Pichis Trail, Porvenir, *Killip & Smith* 25946 (N, Y).

Cuzco: Pillahuata, Cerro de Cusilluyoc, *Pennell* 14028 (F, Y).

A widely distributed but apparently rather rare species, with beautiful large leaves and flowers. It will probably be most often sought in the section of the key which includes plants with 7 to 9 nerved leaves, but because of its suppressed connective spurs it also shows an affinity with the two preceding species.

DOUBTFUL SPECIES

PSAMMISIA LONGICOLLA Hook. f. Bot. Mag. Curtis 91: pl. 5526. 1865.

TYPE LOCALITY: Peru. Type collected by Bateman.

No plant the precise equal of the plate and description of this species has been seen by me. It may be allied to *P. ulbrichiana*, which species does not have the bractlets at the summit of the pedicel, as portrayed in *P. longicolla*. The abruptly contracted corolla also suggests *P. ulbrichiana*, which quite possibly should be supplanted by the earlier name.

PSAMMISIA OBLONGIFOLIA Regel, Ind. Sem. Hort. Petrop. 1866: Suppl. : 33. 1867.

TYPE COLLECTION: Evidently a cultivated plant, the source not mentioned.

From the description it is impossible to assign this name to any species of *Psammisia* I have seen.

PSAMMISIA SCLEROPHYLLA Planch. & Lind. Fl. Serr. Jard. 8: 205. pl. 825. 1853.

TYPE COLLECTION: State of Mérida, Venezuela, altitude about 2,400 meters. Type collected by Funck and Schlim.

This species may be synonymous with either *P. penduliflora* or *P. hookeriana*, but from the oblong leaves and pilose branchlets and pedicels shown in the plate I conclude that it is neither.

13. ANTHOPTERUS Hook. Icon. Pl. 3: pl. 243. 1840

Calyx tube continuous with pedicel, obprismatic, winged to sinuses; limb suberect, 5-lobed, the lobes lanceolate-triangular; corolla subcylindric or subglobose, broadly 5-winged to the lobes, 5-lobed, the lobes triangular, subacute; stamens 10, equal, nearly as long as corolla; filaments membranous, connate at base, attached to the anther dorsally; anthers somewhat membranous, the sacs smooth, the tubules usually longer than the sacs, opening by short introrse clefts; style filiform, about as long as corolla.

Low shrubs with coriaceous alternate pinnately-nerved petioled leaves; inflorescence axillary, racemose, bracteate at base; flowers pedicelled, several to many to an inflorescence, each subtended by a bract.

DISTRIBUTION: Eastern Panama and western Colombia, with one species in northern Peru. Four species are known.

This genus is readily distinguished from *Thibaudia* by its obviously winged corollas and calyces. *A. racemosus* Hook. is the type species.

KEY TO THE SPECIES

Racemes and leaves 10 to 15 cm. long, the leaves lanceolate-elliptic.

1. *A. racemosus*.

Racemes and leaves 5 to 11 cm. long, the leaves ovate.

Leaves cuneate or subattenuate at base, decurrent on the petiole.

2. *A. cuneatus*.

Leaves subcordate or truncate at base.

Bracts of the rachis not exceeding 8 mm. in length; calyx lobes triangular-ovate, 6 to 7 mm. long----- 3. *A. wardii*.

Bracts of the rachis 12 to 17 mm. long; calyx lobes lanceolate, 9 to 10 mm. long----- 4. *A. bracteatus*.

1. *Anthopterus racemosus* Hook. Icon. Pl. 3 : pl. 243. 1839.

Thibaudia racemosa Hoer. Bot. Jahrb. Engler 42: 274. 1909.

Shrub or low tree, probably epiphytic; branchlets subterete, straight, glabrous; petioles glabrous, stout, angled, short; leaf blades lanceolate-oblong, 10 to 15 cm. long, 3 to 4 cm. broad, glabrous, truncate at base, entire at margins, 3-nerved, the midnerve pinnate-veined above; inflorescence axillary, racemose, apparently glabrous in all parts; rachis up to 15 cm. long; pedicels up to 2 cm. long, each subtended by an oblong bract, bibracteolate at middle; calyx urceolate, 5-winged to sinuses, the wings semiovate, the lobes deltoid, acute; corolla submembranous, conical-urceolate; filaments short, connate in a membranous tube; anthers erect, smooth, the tubules about twice as long as the sacs; stigma truncate.

TYPE LOCALITY: Moyabamba, Department of Amazonas, Peru. Type collected by Mathews.

DISTRIBUTION: Known only from the type collection.

This species is evidently quite distinct from the Colombian ones. No specimens of it are available to me, but from the description and the plate its relationship is apparent.

2. *Anthopterus cuneatus* A. C. Smith, sp. nov.

Frutex; ramulis ad nodos imbricato-bracteatis; laminis ovato-ellipticis basi cuneatis vel subattenuatis apice obtuse acuminatis 7-plex-nerviis; inflorescentia racemosa bracteata; floribus glabris; calyce urceolato 5-alato, alis anguste semiovatis, lobis lanceolato-triangularibus; corolla cylindrica 5-alata, alis late semiobovatis; staminibus aequalibus, filamentis basi connatis, tubulis flexilibus quam oculis paullo longioribus.

Shrub; branchlets subterete, glabrous, brown, often bracteate above nodes with several tightly imbricate subcoriaceous oblong blunt bracts 3 to 7 mm. long and 2 to 4 mm. broad; petioles terete, glabrous, 1.5 mm. in diameter, 4 to 5 mm. long; leaf blades coriaceous, ovate-elliptic, 8 to 10 (rarely 11) cm. long, 3.5 to 4.5 cm. broad, glabrous or minutely puberulous above near base, cuneate or subattenuate at base, decurrent on petiole, bluntly acuminate at apex (acumen not exceeding 1 cm. in length), entire and slightly revolute at margins, 7 (rarely 5) plex-nerved, the secondary nerves sharply ascending, oriented at or near base, with the midnerve impressed above, strongly prominent beneath, the veinlets slightly raised on both surfaces; racemes terminal, subtended at base by 2 linear-lanceolate acute bracts 25 mm. long and 3 to 4 mm. broad; rachis grooved, glabrous, up to 11 cm. long, bracteate at base with numerous closely imbricate, oblong or ovate, blunt bracts of varying size, the largest 8 mm. long and 4 mm. broad; pedicels alternate, 1 or 2 per centimeter on mature rachis, subterete, striate, 6 to 10 mm. long, each subtended by a single subcoriaceous oblong subacute bractlet 10 to 12 mm. long and 5 mm. broad; flowers glabrous; calyx tube urceolate, about 5 mm. long and 3 mm. in diameter at summit (exclusive of wings), the wings fleshy, narrowly semiovate, about 1 mm. broad; limb erect, about 5 mm. long including lobes, the lobes lanceolate-triangular,

about 4.5 mm. long, 2 mm. broad at base; corolla membranous, 8 to 9 mm. long, about 3 mm. in diameter exclusive of wings, the wings semiobovate, about 2 mm. broad at the broadest point, each traversed by a single faint longitudinal vein parallel to the margin, the lobes triangular, acute, about 0.8 mm. long and 1 mm. broad at base; stamens erect, 7 mm. long; filaments 2.5 mm. long, connate in a tube for half their length, membranous, glabrous; anther sacs slightly granular, about 2 mm. long, gradually leading into wide flexible tubules 3 mm. long opening by wide introrse clefts 1 to 1.5 mm. long; style 8 to 9 mm. long, the stigma truncate.

Type in the herbarium of the New York Botanical Garden, collected on "páramo," Barbacoas, Department of Nariño, Colombia, altitude 1,000 meters, 1851 to 1857, by J. Triana (no. 2718). Duplicate at K.

DISTRIBUTION: Known only from the type collection.

The collector's notes refer to the habitat as "páramo," although a páramo proper could not exist at such low altitude. It is a species distinguished from others of the genus by its cuneate leaf-base, numerous and varied bracts, and slightly smaller flowers.

3. *Anthopterus wardii* Ball in Hook. Icon. Pl. 15: pl. 1465. 1884.

Thibaudia wardii Hoer. Bot. Jahrb. Engler 42: 274. 1909.

Shrub or low tree; branchlets subterete, faintly puberulous when young, becoming glabrous, cinereous; petioles subterete, glabrous, 2 to 4 mm. long; leaf blades oblong or ovate-oblong, 6 to 12 cm. long, 2.5 to 5 cm. broad, essentially glabrous, subcordate at base, bluntly acuminate at apex, entire and slightly revolute at margins, 5 to 7 plic-nerved, the secondary nerves oriented near base, ascending, with the midnerve slightly impressed or plane above, prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces; inflorescence axillary, short-racemose; rachis subterete, glabrous, 1 to 2 cm. long, circumscribed at base by a few triangular bractlets up to 5 mm. long; pedicels subterete, glabrous, 10 to 20 mm. long, each subtended by a single oblong bractlet 3 to 6 mm. long; flowers glabrous; calyx tube urceolate, 3 to 4 mm. long and about 2.5 mm. in diameter at summit exclusive of wings, the wings narrowly semiovate, about 1 mm. broad, opaque; limb subspreading, 7 to 8 mm. long including lobes, the lobes triangular-ovate, acute, 6 to 7 mm. long and about 4 mm. across, traversed by about 7 parallel branching veins not quite reaching the margins; corolla membranous, 10 to 11 mm. long, about 4 mm. in diameter, slightly contracted at base and apex, the wings semiobovate, 2 to 3 mm. across their broadest point, each with a single longitudinal vein parallel to the margin, the lobes ovate, about 1 mm. long; stamens 7 to 8 mm. long; filaments about 4 mm. long, membranous, connate for about half their length, glabrous, adherent to corolla; anther sacs about 2 mm. long, gradually leading into flexible tubules about 3 mm. long, opening by introrse clefts about half their length; stigma truncate.

TYPE LOCALITY: Buenaventura, Department of El Valle, Colombia, near sea level. Type collected by R. Ward.

DISTRIBUTION: Pacific slope of Western Cordillera from Panama to southern Colombia, between sea level and 1,200 meters altitude.

PANAMA: Darién, Cerro de Garagará, Sambú basin, *Pittier* 5652 (N.).

COLOMBIA: Río de Santa Rosa, *André* K1335 (K).

EL CHOCÓ: Quibdó, *Archer* 1901 (N, Y).

EL VALLE: Buenaventura, *André* 269 (K); *Lehmann* K179 (K); *Killip* 5223 (B, G, N, Y), 11851 (N, Y).

NARIÑO: Between Barbacoas and Tuquerres, *Triana* 2716 (K, Y).

"PERU: *Maclean*" (K).

Concerning the last specimen cited there is probably a confusion of labels, as it is quite unlikely that the species would be found in Peru and Colombia and in no intermediate places. It is a species of considerable variation; the Panama specimen has a calyx with broader wings and shorter lobes, a corolla with broader wings, and the leaves smaller than in typical material from Buenaventura. The Triana specimen is more or less intermediate, suggesting that the broader flower may be concomitant with increased altitude. At Buenaventura the species is reported as growing in mangrove swamps.

4. *Anthopterus bracteatus* A. C. Smith, sp. nov.

Frutex; laminis oblongo-ovatis basi subcordatis vel truncatis apice obtuse acuminatis 5 ad 7 pli-nerviis; inflorescentia racemosa bracteata; floribus glabris; calyce urceolato 5-alato 5-lobato, lobis elongatis lanceolato-triangularibus; corolla 5-alata, alis semiobovatis; staminibus aequalibus, filamentis basi connatis, tubulis flexilibus quam loculis duplo longioribus.

Shrub; branchlets subterete or obtusely angled, glabrous or minutely pale-puberulous when young; petioles terete, subglabrous, 1.5 mm. in diameter, about 2 mm. long; leaf blades coriaceous, oblong-ovate, 7 to 9 cm. long, 3 to 4 cm. broad, glabrous or essentially so, subcordate or truncate at base, bluntly acuminate at apex (acumen less than 1 cm. long), entire and plane at margins, 5 to 7 pli-nerved, the secondary nerves sharply ascending, oriented near base, the mid-nerve and secondary nerves impressed above, prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces; racemes axillary near ends of branchlets; rachis obtusely angled, glabrous, up to 5 cm. long, bracteate at base with numerous closely imbricate, ovate, oblong, or lanceolate bracts, the largest of these 12 mm. long and 3 mm. broad; pedicels alternate, about 3 per centimeter on mature rachis, striate, about 2 cm. long, each subtended by a single oblong-lanceolate acute bractlet 12 to 17 mm. long and 2 to 3 mm. broad; flowers glabrous; calyx tube about 5 mm. long and 3 mm. in diameter at summit exclusive of wings, the wings narrowly semiovate, about 1.5 mm. broad; limb erect, 10 to 11 mm. long including lobes, the lobes lanceolate-triangular, acute, 9 to 10 mm. long, 3.5 mm. broad at base, traversed by several close parallel longitudinal freely branching veins not quite reaching the margins; corolla 12 to 13 mm. long, 4 to 5 mm. in diameter (exclusive of wings) near base, contracted above, the wings semiobovate, about 3.5 mm. across broadest point, each traversed by a single faint longitudinal vein parallel to margin, the lobes erect, 1 mm. long, 1.2 mm. broad at base; stamens erect, 10 mm. long; filaments 5 mm. long, connate in a tube at base, free above, membranous, glabrous; connective short; anther sacs slightly granular, about 2 mm. long, gradually leading into wide flexible tubules 4 mm. long opening by wide introrse clefts half their length; style about 11 mm. long, the stigma truncate.

Type in the herbarium of the New York Botanical Garden, collected at Timbiquí, above Popayán, Department of El Cauca, Colombia, by F. C. Lehmann (no. BT949).

DISTRIBUTION: Known only from the type collection.

The present species is allied to *A. wardii*, from which it is distinguished by its larger bracts and lanceolate calyx lobes.

EXPLANATION OF PLATE 11.—*Anthopterus bracteatus*, from photograph of type sheet. About one-half natural size.

EXCLUDED SPECIES

ANTHOPTERUS MUCRONATUS Benth. Pl. Hartw. 221. 1846.

Thibaudia mucronata Hoer. Bot. Jahrb. Engler 42: 274. 1909.

TYPE LOCALITY: Near Pitayo, Department of El Cauca, Colombia. Type collected by Hartweg (no. 1210).

Examination of the type specimen shows that it must be placed in the tribe Vaccinieae. Probably it is a species of *Vaccinium*.

14. THIBAUDIA R. & P.; St. Hil. Expos. Fam. Nat. 362. 1805

(*Eurygania* Klotzsch, Linnaea 24: 26. 1851)

Calyx tube articulate with pedicel (continuous in the section *Agathothibaudia*), short-cylindric or campanulate, sometimes narrowly 5-winged to the sinuses; limb erecto-patent, 5-lobed, the lobes triangular, subacute; corolla subcylindric, sometimes 5-angled, 5-lobed, the lobes triangular or oblong, subacute; stamens 10, equal, often nearly as long as corolla; filaments distinct or connate, attached to the anther dorsally near its base; anthers firm or membranous, the sacs smooth or slightly granular, the tubules as long as the sacs or longer (rarely more than twice as long), opening by elongate introrse clefts; style filiform, about as long as corolla, frequently exerted.

Shrubs of various habit, often epiphytic, with coriaceous or subcoriaceous, alternate, pinnate-veined or pinnately-nerved, petioled leaves; inflorescence axillary or terminal, subfasciculate or racemose; flowers pedicelled, few to many to an inflorescence; pedicels deciduously bibracteolate.

DISTRIBUTION: Mountainous South America from Colombia to Bolivia and eastward to Mount Roraima in British Guiana (also one species in Costa Rica). Forty species are here described and in addition there are nine names which I am unable to place.

The relationships of this genus have been discussed in a previous section of this treatment. It is characterized by smooth or slightly granular anther sacs and more or less flexible, wide tubules. *T. melliflora* R. & P. is the type species.

KEY TO THE SPECIES

Calyx continuous with pedicel (section *Agathothibaudia* Hoer.).

Leaves acuminate at apex, at least 3 times as long as broad; flowers thin-carnose, racemose.

Leaves oblong or oblong-lanceolate, 3 to 5 times as long as broad

1. *T. floribunda*.

Leaves lanceolate, about 8 times as long as broad----- 2. *T. longifolia*.

Leaves rounded or obtuse at apex, less than twice as long as broad; flowers coriaceous, subfasciculate----- 3. *T. turbinata*.

Calyx articulate with pedicel (section *Eurygania* Kl.).

Filaments distinct (sometimes loosely coherent at base, never connate distally).

Calyx and corolla rigidly carnosae; calyx limb suberect, as long as the tube or longer; corolla strictly tubular.

Anthers more than 11 mm. long.

Leaves truncate or subcordate at base.

Leaf margins entire, the principal secondary veins 5 to 8 to a side; flower parts stout, the calyx about 12 mm. long; anthers 20 mm. long, the sacs about 3 times as long as tubules (Colombia)

4. *T. pachyantha*.

Leaf margins serrate, the principal secondary veins 3 to 5 to a side; calyx less than 9 mm. long; anthers up to 14 mm. long, the sacs not more than twice as long as tubules.

Branchlets rugose, subterete; leaves minutely reddish pilose beneath (Bolivia)----- 5. *T. macrocalyx*.

Branchlets sulcate-angled; leaves glabrous (Peru)
6. *T. engleriana*.

Leaves attenuate or long-cuneate at base.

Calyx tube strongly papillose; filaments dorsally pilose; leaves not exceeding 6 cm. in length----- 7. *T. axillaris*.

Calyx tube rugose, not papillose; filaments pilose at margins only; leaves 9 to 18 cm. long.

Leaf apex acute; calyx apophysate at base, the limb about 3 times as long as tube; anthers about 20 mm. long----- 8. *T. andrei*.

Leaf apex rounded or obtuse; calyx hardly apophysate, the limb about as long as tube; anthers 12 to 17 mm. long.

9. *T. rigidiflora*.

Anthers 9 mm. long or less.

Calyx campanulate; corolla cylindric; anthers 7 to 9 mm. long (Venezuela and British Guiana).

Rachis about 2 cm. long; anthers produced at base into a slender tip----- 10. *T. jahnii*.

Rachis about 1 cm. long or less; anthers not noticeably produced at base.

Leaves nearly 3 times as long as broad; stamens not exerted or barely so----- 11. *T. formosa*.

Leaves less than twice as long as broad; stamens exerted at maturity----- 12. *T. roraimae*.

Calyx strongly apophysate; corolla conical; anthers about 5.5 mm. long (Peru)----- 13. *T. apophysata*.

Calyx and corolla soft-carnose (usually flattened by pressure of drying).

Branchlets stiff; leaves subcuneate at base; flowers subfasciculate (rachis stout, less than 1 cm. long); pedicels not much longer than flowers.

Connectives with vestigial spurs near summit; filaments less than one-third as long as anthers (Amazonian Colombia).

14. *T. cupatensis*.

Connectives unspurred; filaments about half as long as anthers (Venezuela and British Guiana).

Calyx and pedicel bearing persistent glandular hairs 1 to 1.5 mm. long----- 15. *T. glandulifera*.

Calyx and pedicel without glandular hairs.

Pedicel surmounted by a persistent involucre of 2 fused bractlets.
16. *T. involucrata*.

Pedicel without fused bractlets at summit.

Corolla, calyx, and pedicel glabrous; calyx lobes triangular, acute, 1 mm. long or more----- 17. *T. nutans*.

Corolla, calyx, and pedicel minutely and densely pale puberulous; calyx truncate----- 18. *T. truncata*.

Branchlets slender, lax; leaves truncate or subcordate at base; flowers racemose (rachis slender, 1 to 3 cm. long); pedicels slender, about twice as long as flowers----- 19. *T. laxa*.

Filaments firmly connate in a tube.

Leaves 12 to 17 cm. long, pinnately-nerved or nerved from base.

Inflorescence paniculate; flower parts glabrous or subglabrous; filaments glabrous.

Leaves narrowly oblong, up to 5 cm. broad, long-acuminate; corolla about 10 mm. long (Costa Rica)----- 20. *T. costaricensis*.

Leaves oblong, 5 to 8 cm. broad; corolla 12 to 17 mm. long (Colombia).

Leaves about twice as long as broad, bullate, abruptly acuminate, rounded at base----- 21. *T. paniculata*.

Leaves at least 3 times as long as broad, subacute or bluntly acuminate, cuneate at base----- 22. *T. archeri*.

Inflorescence racemose; flower parts pilose (hairs about 0.25 mm. long); filaments dorsally pilose near summit, the hairs 0.3 mm. long (Colombia)----- 23. *T. pennellii*.

Leaves not exceeding 9 cm. in length, predominantly pinnate-veined.

Leaves sulcate, strongly revolute at margins.

Flowers essentially glabrous, 1 to 3 to an inflorescence (Colombia).

24. *T. parvifolia*.

Flowers densely tomentose, several to an inflorescence (Peru).

25. *T. tomentosa*.

Leaves not noticeably sulcate, plane or slightly revolute at margins.

Calyx limb erect, twice as long as tube (limb about 7 mm. long); inflorescence densely tomentose, associated with cavendishoid bracts----- 26. *T. anomala*.

Calyx limb erecto-patent, hardly longer than tube; inflorescence glabrous or pilose, not associated with large bracts.

Leaf margins serrate (northern and central Peru).

Calyx and pedicel pubescent, the hairs pale, lax, about 0.3 mm. long.

Leaves oblong-lanceolate, 3 or 4 times as long as broad; corolla subglabrous within.

Corolla densely pilose without, the hairs pale, about 0.5 mm. long----- 27. *T. phylliriaefolia*.

Corolla glabrous----- 28. *T. moricandi*.

Leaves obovate-oblong, 2 or 3 times as long as broad; corolla densely tomentose within distally----- 29. *T. obovata*.

Calyx and pedicel glabrous (young pedicels pilose in no. 33).

Filaments strongly pilose at margins distally (hairs up to 0.5 mm. long); anthers 8 to 10 mm. long.

Leaves oblong, up to 2 cm. broad; corolla subglabrous within; anthers subglabrous----- 30. *T. angustifolia*.

Leaves ovate, 3 to 3.5 cm. broad; corolla tomentose within distally; anthers pilose at base----- 31. *T. urbaniana*.

Filaments glabrous or very sparsely pilose; anthers up to 6 mm. long.

Corolla tomentose or pilose within distally; anthers pilose at base; calyx not noticeably rugose.

Leaves ovate, acute or subacute at apex.

Leaves 3 to 4.5 cm. broad----- 32. *T. harmsiana*.

Leaves 1 to 2.5 cm. broad----- 33. *T. ovata*.

Leaves obovate, rounded (or apiculate) at apex.

34. *T. spathulata*.

Corolla glabrous within; anthers glabrous; calyx rugose.

35. *T. ovalifolia*.

Leaf margins entire or shallowly and obscurely crenate (Peru and Bolivia).

Flowers 1 to 3 to an inflorescence; leaves rounded or frequently emarginate at apex----- 36. *T. biflora*.

Flowers several to an inflorescence; leaves subacute or obtuse at apex.

Leaves about 4 times as long as broad. Flowers slender; pedicels about 0.7 mm. in diameter; calyx tube 1.5 mm. in diameter----- 37. *T. herrerae*.

Leaves 2 or 3 times as long as broad.

Lower surface of leaves and young calyx densely white-pilose (hairs spreading, up to 0.5 mm. long)-- 38. *T. regularis*.

Lower surface of leaves and calyx essentially glabrous (rarely somewhat pilose).

Branchlets and inflorescence glabrous; anthers about 4 mm. long (Bolivia)----- 39. *T. boliviensis*.

Branchlets, rachis, and pedicels white-pilose; anthers about 6 mm. long (Peru)----- 40. *T. melliflora*.

1. *Thibaudia floribunda* H. B. K. Nov. Gen. & Sp. 3:269. *pl.* 254. 1818.

Thibaudia pichinchensis Benth. Pl. Hartw. 223. 1846.

Shrub or low tree with elongate branches; branchlets subterete, brownish and sparsely puberulous when young, becoming glabrous and cinereous; petioles rugose, stout, up to 4 mm. in diameter, 5 to 10 mm. long, glabrous, winged above; leaf blades subcoriaceous, oblong or lanceolate-oblong, 8 to 22 cm. long, 2.5 to 6 cm. broad, cuneate at base, acuminate at apex, entire at margins, glabrous, 5 (rarely 3 or 7)-pli-nerved, the secondary nerves oriented above base, with the midnerve impressed above, prominent beneath, the veinlets reticulate, plane above, slightly raised beneath; inflorescence axillary, copious, often from large leafless branchlets, racemose, 15 to 30 flowered, essentially glabrous in all parts; rachis slender, striate, 2 to 6 cm. long; pedicels subrugose, 5 to 10 mm. long, each subtended by an oblong bractlet 2 to 4 mm. long, minutely bibracteolate near base (bractlets sometimes fimbriate, rachis and pedicels sometimes minutely puberulous), continuous with calyx; calyx tube campanulate, 2 to 3 mm. long, 2 to 3 mm. in diameter at anthesis; limb subspreading, 1 to 2 mm. long including lobes, the lobes acute, 1 mm. long or less; corolla subcylindric, 12 to 16 mm. long, 3 to 4 mm. in diameter, the lobes 1 to 1.5 mm. long; stamens 8.5 to 15 mm. long; filaments pale castaneous, 2 to 4 mm. long, distinct or loosely coherent, sparsely pilose distally with hairs up to 0.2 mm. long; anther sacs smooth, slender, 2.5 to 4 mm. long; tubules wide, 5 to 8 mm. long, opening by elongate clefts; stigma peltate.

TYPE LOCALITY: Bogotá, Department of Cundinamarca, Colombia, altitude about 3,000 meters. Type collected by Humboldt and Bonpland (or by Mutis?).

DISTRIBUTION: Eastern and Central Cordilleras of Colombia and southward along the Andes to central Peru, altitude 2,400 to 3,600 meters.

COLOMBIA: *Purdie* (K). Barroblanco, *André* 1926 (K).

SANTANDER: Las Vegas, *Killip & Smith* 15820 (N, Y). La Baja and vicinity, *Killip & Smith* 18087 (N, Y), 18791 (N, Y).

CUNDINAMARCA: Bogotá and vicinity, *Humboldt & Bonpland* (B, type); *Holton* 632 (Y); *Dawe* 316 (K, N); *Pennell* 1924 (N, Y). Pacho, *Stuebel* 164a (B).

CALDAS: Old Quindío Trail, *Killip & Hazen* 9462 (N, Y). Cerro Tatamá, *Pennell* 10460 (Y).

EL CAUCA: Páramo de Guanacas, *Hartweg* 1225 (K). Headwaters of Río Lopez, Río Palo basin, Tierra Adentro, *Pittier* 1073 (N). Mount Puracé, *Pennell & Killip* 6524 (B, N, Y). San Antonio, *Pennell & Killip* 7304 (N, Y).

NARIÑO: Barbacoas, *André* (K).

ECUADOR: *Hartweg* 1224 (K).

PICHINCHA: Quito, *Jameson* (K). Mount Pichincha, *Hartweg* 1217 (B, K, type of *T. pichinchensis*); *Sodi* (B), 92/11b (B), 92/15 (B); *Jameson* 293 (K). Niebli, *André* 3797 (K).

TUNGURAGUA: *Spruce* 6088 (K, Y).

PERU.

HUÁNUCO: *Sawada* P43 (F). Playapampa, *Macbride* 4874 (F).

Study of a large series of specimens referred to *T. floribunda* and *T. pichinchensis* indicates that only one species is represented. The type specimen of *T. floribunda* has glabrous flowers, calyx lobes slightly longer than broad, and linear bractlets. The type specimen of *T. pichinchensis* has short-brown-pilose pedicels and calyces, short triangular calyx lobes, and triangular pilose bractlets. Between these two forms are found specimens with every possible combination of these characters, indicating that they are purely individual and not even characteristic of geographic localities. Of the above-cited specimens, the most distinctive is *Hartweg* 1224, which is very robust, with large truncate-based leaves; however, it does not seem to present differences of specific value. A local name of the Bogotá region is "uva de granis."

2. *Thibaudia longifolia* H. B. K. Nov. Gen. & Sp. 3: 269. 1818.

Psammisia longifolia Klotzsch, Linnaea 24: 43. 1851.

Thibaudia lehmannii Hoer. Bot. Jahrb. Engler 42: 311. 1909.

Shrub; branchlets subterete and puberulous when young, becoming angled, glabrous and cinereous; petioles subterete, 8 to 10 mm. long, glabrous; leaf blades thick-coriaceous, lanceolate-oblong, 16 to 30 cm. long, 2 to 3.5 cm. broad, cuneate or subattenuate at base, acute at apex, entire, glabrous above, sparsely pilose beneath with scattered short appressed hairs, becoming glabrous, 5 to 7 pinnately-nerved, the secondary nerves oriented above base, ascending, with the mid-nerve impressed above, prominent beneath, the veinlets reticulate, obscure; inflorescence axillary, racemose, 20 to 40 flowered; rachis slender, striate, deciduously pilose with short dark hairs about 0.2 mm. long, 5 to 14 cm. long; pedicels striate, pubescent as the rachis or glabrous, 7 to 12 mm. long, each subtended by a lanceolate subfimbriate bractlet 3 to 4 mm. long, bibracteolate near base, continuous with calyx; calyx tube subcylindric or narrowly campanulate, 2.5 to 3 mm. long and 2 mm. in diameter at anthesis, subglabrous, rugose; limb 1 to 1.5 mm. long including lobes, the lobes apiculate, less than 1 mm. long; corolla cylindric, glabrous, about 14 mm. long, 2 to 3 mm. in diameter, the lobes about 1 mm. long; stamens about 12 mm. long; filaments castaneous, membranous, 3 to 4 mm. long, connate most of their length, densely pilose at margins distally with pale hairs about 0.2 mm. long; anther sacs smooth, about 3 mm. long, narrowed and sparsely setose at base; tubules wide, erect, 5 to 7 mm. long, opening by clefts about half as long; style slender, striate, about as long as corolla, the stigma peltate.

TYPE LOCALITY: Andes of the Quindío region, near La Ceja, Colombia, altitude about 3,200 meters. Type collected by Humboldt & Bonpland.

DISTRIBUTION: Andes of central and southern Colombia, altitude 2,600 to 3,200 meters.

COLOMBIA.

EL CAUCA: Andes west of Popayán, *Lehmann* 8232 (B, type of *T. lehmanni*, F, N).

Differs from *T. floribunda* only in the lanceolate leaves. There seem to be no specimens intermediate between the two species.

3. *Thibaudia turbinata* (Kuntze) Hoer. Bot. Jahrb. Engler 42:272. 1909.

Chupalon turbinatum Kuntze, Rev. Gen. Pl. 3²:190. 1898.

Low shrub; branchlets subterete, glabrous, cinereous; petioles subrugose, glabrous, narrowly winged, 4 to 5 mm. long; leaf blades coriaceous, ovate or slightly obovate, 5 to 8 cm. long, 3 to 5 cm. broad, subattenuate at base, rounded at apex, entire and slightly revolute at margins, glabrous, sometimes sparsely punctate above, pinnate-veined, the midvein impressed above, prominent beneath, the secondary veins 3 to 5 to a side, spreading or ascending, plane above, raised beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary, subfasciculate or short-racemose (rachis less than 5 mm. long), 2 to 6 flowered, glabrous in all parts; pedicels rugose, 15 to 20 mm. long, each subtended by an oblong acute bractlet about 2 mm. long, minutely bibracteolate near base, swollen distally and continuous with calyx; calyx coriaceous, rugose, 5-angled (angles corresponding to lobes), the tube obprismatic, 4 to 6 mm. long, 4 to 5 mm. in diameter at anthesis, the limb erect, 4 to 6 mm. in diameter including lobes, the lobes thin-margined, apiculate, 1 to 1.5 mm. long, the sinuses rounded; corolla thick-carnose, rigidly cylindric, 15 to 16 mm. long, about 4 mm. in diameter, the lobes 1.5 mm. long; stamens about 16 mm. long; filaments dark castaneous, about 3 mm. long, loosely coherent at base, pilose at margins distally with pale stiff spreading hairs about 0.2 mm. long; anther sacs slightly granular, slender, 9 to 10 mm. long, incurved at base; tubules wide, 5 to 6 mm. long, opening by oval clefts about one-third their length; style stout, the stigma truncate.

TYPE LOCALITY: Santa Rosa, Bolivia, altitude 2,000 to 2,600 meters. Type collected by Kuntze, April 3, 1892.

DISTRIBUTION: Known only from the type collection.

BOLIVIA: Santa Rosa, *Kuntze* (B, Y, type).

A very distinct species of the section *Agathothibaudia* and sharply distinguished from the two preceding.

4. *Thibaudia pachyantha* A. C. Smith, sp. nov.

Frutex vel arbor parva; laminis ovato-oblongis basi subcordatis vel truncatis apice subacutis pinnatinerviis; inflorescentia breviter racemosa glabra; floribus coriaceo-carnosis; calyce campanulato, limbo erecto quam tubo triplo longiore; corolla rigida cylindrica; staminibus aequalibus, filamentis distinctis, antheris rigide carnosis, tubulis quam loculis triplo brevioribus.

Shrub or low tree; branchlets subterete, violaceous, glabrous; petioles rugose, subterete, 3 to 4 mm. long, glabrous; leaf blades thick-coriaceous, ovate-oblong, 8 to 12 cm. long, 4 to 7 cm. broad, subcordate or truncate at base, subacute at apex, entire and narrowly revolute at margins, glabrous, pinnate-veined, the midvein nearly plane above, strongly prominent beneath, the secondary veins spreading, ascending and connected near margins, 5 to 8 to a side, plane above, prominent beneath, the veinlets reticulate, raised on both surfaces; inflorescence short-racemose, glabrous in all parts, 8 to 12 flowered; rachis stout, violaceous, glabrous, 1.5 to 2.5 cm. long; pedicels rugose, 20 to 30 mm. long, swollen distally, each subtended by a subcoriaceous ovate bractlet about 2 mm. long, articulate with calyx; calyx tube thick-coriaceous, subcylindric or campanulate, subrugose, about 3 mm. long and 5 to 6 mm. in diameter; limb erect, thick-coriaceous, 8 to

9 mm. long including lobes, the lobes deltoid, 1.5 to 2 mm. long, 4 mm. across, the sinuses subacute; corolla thick-coriaceous, rigidly cylindric, 20 to 23 mm. long and about 5 mm. in diameter; stamens often slightly exserted; filaments castaneous, stout, often loosely coherent, 4 to 5 mm. long, glabrous, leading into long, slender connectives; anthers rigidly carnose, granular, 20 to 21 mm. long, including tubules, the tubules about 5 mm. long, coriaceous, distinct, opening by clefts nearly as long; style filiform, striate, about as long as corolla, the stigma truncate.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected near Tuquerres, Department of Nariño, Colombia, altitude 900 meters, by J. Triana (no. 2689).

DISTRIBUTION: Known only from the type collection.

The present specimen, although very incomplete, indicates that the plant is a striking shrub, rigid in all its parts. It is a very distinct species, as indicated in the key.

5. *Thibaudia macrocalyx* Remy, Ann. Sci. Nat. III. Bot. 8: 235. 1847.

Ceratostema serratum Britton, Bull. Torrey Club 20: 138. 1893.

Shrub or low tree 2 to 6 meters high; branchlets subterete or rugose, glabrous, brownish; petioles rugose, 2 to 4 mm. long, glabrous, narrowly angled; leaf blades thick-coriaceous, ovate or oblong-ovate, 5 to 9 cm. long, 2.5 to 4.5 cm. broad, truncate or subcuneate at base, obtuse or subacute at apex, shallowly serrate and slightly revolute at margins (serrations about 2 or 3 per centimeter), glabrous and olivaceous above, deciduously pilose beneath with minute appressed stout reddish hairs up to 0.4 mm. long, pinnate-veined, the midvein impressed above, prominent beneath, the secondary veins spreading, 3 to 4 to a side, nearly plane above, raised beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence subfasciculate or short-racemose (rachis less than 1 cm. long), glabrous in all parts, 3 to 6 flowered; pedicels rugose, 8 to 12 mm. long, each subtended by a subcoriaceous lanceolate-oblong bractlet 3 to 5 mm. long, bi- or tribracteolate near base, swollen distally; calyx rugose, the tube short-cylindric or broadly campanulate, 4 to 5 mm. long and about 5 mm. in diameter at anthesis, the limb erect, 4 to 5 mm. long including lobes, the lobes acute, 1 to 1.5 mm. long; corolla carnose, rigidly cylindric, about 20 mm. long and 5 mm. in diameter, the lobes oblong, obtuse, about 2.5 mm. long; stamens about 18 mm. long; filaments dark castaneous, slender, 4 to 5 mm. long, pilose at margins distally with pale spreading hairs up to 0.3 mm. long, leading into long slender connectives; anthers golden-yellow, the sacs slightly granular, 9 to 10 mm. long, the tubules erect, flexible, 5 to 6.5 mm. long, opening by elongate clefts; stigma peltate.

TYPE LOCALITY: Cajapi and Tajeti, Yungas, Department of La Paz, Bolivia, altitude 3,500 meters. Type collected by D'Orbigny.

DISTRIBUTION: Eastern Cordillera of Bolivia, altitude 2,000 to 3,700 meters.

BOLIVIA: Huaycani, *Pearce*, in May, 1866 (K).

LA PAZ: Yungas, Unduavi, *Pearce*, in March, 1866 (K); *Rusby* 2035 (F, G, N, Y, type of *Ceratostema serratum*); *Buchtien* 30 (B, F, G, Y), 910 (F, N); *Julio* 447 (N). Pongo, *Tate* 200 (Y).

Although I have not seen the type of this very coherent species, the description agrees exactly with the above specimens. It is an unmistakable species, related as indicated in the key.

6. *Thibaudia engleriana* Hoer. Bot. Jahrb. Engler 42: 312. 1909.

Shrub about 2 meters high; branches subterete, cinereous, glabrous; branchlets brownish, stout, sharply angled, glabrous; petioles rugose, 4 to 6 mm. long,

subterete; leaf blades rigidly coriaceous, oblong, 5 to 7 cm. long, 2 to 3 cm. broad, subcordate or truncate at base, obtuse at apex, strongly revolute and crenate at margins, glabrous, pinnate-veined, the midvein plane or sulcate above, prominent beneath, the secondary veins spreading or ascending, 3 or 4 to a side, plane on both surfaces, the veinlets inconspicuous, immersed; inflorescence short-racemose, 4 to 8 flowered; rachis subrugose, about 2 cm. long, pale puberulous when young; pedicels rugose, nigrescent, 16 to 20 mm. long, glabrous, each subtended by an oblong, coriaceous, deciduously fimbriate bract about 3 mm. long, bibracteolate near base; calyx tube cylindric, rugose, about 4 mm. long and 3.5 mm. in diameter at anthesis, glabrous or sparsely minutely glandular; limb rigidly coriaceous, about 6 mm. long including lobes, the lobes acute, about 4 mm. long and 4 to 5 mm. broad, the sinuses acute; corolla rigidly car-nose, cylindric, glabrous, about 18 mm. long and 5 mm. in diameter; stamens slightly shorter than corolla; filaments subcoriaceous, subnigrescent, glabrous, loosely coherent, about 3 mm. long; anther sacs slightly granular, 6 mm. long; tubules flexible, about 8 mm. long, opening by clefts nearly as long; style nigrescent, the stigma truncate.

TYPE LOCALITY: Huacapistana, Department of Junín, Peru, altitude 3,000 to 3,100 meters. Type collected by Weberbauer (no. 2055).

DISTRIBUTION: Known only from the type collection.

PERU.

JUNÍN: Huacapistana, *Weberbauer* 2055 (B, type).

This is a very distinct species, with leaves and flowers approximating the preceding, but with extraordinarily stiff angled branchlets.

7. *Thibaudia axillaris* Rusby, sp. nov.

Frutex; ramulis angulatis; laminis oblongis vel subspathulatis basi attenuatis apice subacutis margine leviter crenatis et valde revolutis pinnatinerviis; inflorescentia subfasciculata glabra; calycis tubo breviter cylindrico papilloso, limbo erecto quam tubo triplo longiore 5-lobato; corolla coriaceo-carnosa rigide cylindrica; staminibus aequalibus, filamentis distinctis tomentosis, antheris longis, tubulis quam loculis duplo brevioribus.

Shrub; branchlets sharply angled, cinereous, glabrous; petioles rugose, 3 to 5 mm. long, angled, glabrous; leaf blades thick-coriaceous, oblong or subspatulate, 4 to 6 cm. long, 1.5 to 2 cm. broad, attenuate at base, obtuse or subacute at apex, strongly revolute at margins and shallowly crenate towards apex, glabrous, pinnate-veined, the midvein impressed above, prominent beneath, the secondary veins spreading, 3 to a side, slightly impressed above, raised beneath, the veinlets reticulate, slightly impressed above, plane beneath; inflorescence subfasciculate, glabrous in all parts, 2 or 3 flowered (?); pedicels rugose, 8 to 13 mm. long, each subtended by an oblong subcoriaceous bractlet about 2 mm. long, deciduously bibracteolate near base, articulate with calyx; calyx tube covered with stout short appressed ascending papillae, short-cylindric, about 3 mm. long and 5 mm. in diameter at anthesis; limb erect, coriaceous, about 8 mm. long including lobes, the lobes apiculate, about 2 mm. long, the sinuses rounded; corolla thick-carnose, rigidly cylindric, 24 to 27 mm. long and about 5 mm. in diameter, the lobes oblong, subacute, about 2 mm. long; stamens as long as corolla or slightly exerted; filaments stout, castaneous, distinct, 6 to 7 mm. long, distally soft-tomentose, especially dorsally, with yellowish hairs about 0.2 mm. long, leading into long slender connectives; anther sacs slightly granular, 16 to 17 mm. long; tubules flexible, 8 to 9 mm. long, opening by clefts nearly as long; style filiform, about as long as corolla, the stigma truncate.

Type in the herbarium of the New York Botanical Garden, collected at Cocopunco, Cordillera Real, Department of La Paz, Bolivia, altitude about 3,100 meters, March 24 to 29, 1926, by G. H. H. Tate (no. 372).

DISTRIBUTION: Known only from the type collection.

Characterized by angled branchlets, stiffly revolute leaves, papillose calyx tube, extraordinarily long anthers, and unusually tomentose filaments. The description is included here at the request of Doctor Rusby.

8. *Thibaudia andrei* A. C. Smith, sp. nov.

Frutex vel arbor parva; laminis oblongis basi attenuatis vel anguste cuneatis apice acutis pinnatinerviis; inflorescentia breviter racemosa glabra; calyce rigide coriaceo rugoso, tubo apophysato, limbo erecto quam tubo triplo longiore; corolla rigide cylindrica; staminibus aequalibus, filamentis distinctis superne pilosis, antheris rigidis, tubulis erectis quam loculis brevioribus.

Shrub or small tree; branches and branchlets subterete, rugose, violaceous, glabrous; petioles rugose, subnigrescent, up to 5 mm. long, winged distally; leaf blades oblong, 10 to 15 cm. long, 4 to 6 cm. broad, attenuate or narrowly cuneate at base, acute at apex, entire and slightly revolute at margins, glabrous, pinnate-veined, the midvein slightly impressed above, very prominent beneath, the secondary veins ascending, 3 or 4 to a side, impressed above, prominent beneath, the veinlets reticulate, raised beneath; inflorescence short-racemose, glabrous in all parts, 6 to 10 flowered; rachis subterete, violaceous, 1.5 to 2 cm. long; pedicels rugose, 18 to 22 mm. long, each subtended by an oblong deciduous fimbriate bractlet about 2 mm. long, bibracteolate near base (bractlets ovate, 1 to 2 mm. long, puberulous, sometimes imbricate), swollen distally, obscurely articulate with calyx; calyx rigidly coriaceous, rugose, the tube apophysate, about 2 mm. long and 5 mm. in diameter at anthesis, the limb erect, 6 to 7 mm. long including lobes, the lobes broadly deltoid, about 1 mm. long and 4 mm. across, the sinuses rounded; corolla rigidly cylindric, 23 to 26 mm. long and about 5 mm. in diameter, the lobes oblong, about 1.5 mm. long and 2 mm. broad; stamens about as long as corolla; filaments castaneous, distinct, 4 to 5 mm. long, distally pilose with hairs about 0.3 mm. long, leading into long slender connectives; anther sacs castaneous, rigid, granular, 11 to 15 mm. long; tubules erect, rigid, 6 to 10 mm. long, opening by clefts nearly as long (total length of anthers about 21 mm.); style angled, the stigma truncate.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected near Barbacoas, Department of Nariño, Colombia, by E. André (with no. 3028).

DISTRIBUTION: Andes of southern Colombia.

COLOMBIA.

NARIÑO: San Pablo, *André*, with 1340 (K).

The above cited specimens are in poor condition, but there is no doubt that they represent a distinct species allied to the following but distinguished from it by having the leaf apex acute, the calyx noticeably apophysate at base and with a long limb, and the anthers longer.

9. *Thibaudia rigidiflora* A. C. Smith, sp. nov.

Frutex; laminis nitidis ellipticis vel obovato-ellipticis basi attenuatis apice obtusis pinnatinerviis; inflorescentia racemosa glabra; calyce cylindrico 5-lobato; corolla rigide cylindrica; staminibus aequalibus, filamentis distinctis superne pilosis, tubulis loculos subaequantibus.

Shrub; branchlets angled, glabrous; petioles glabrous, rugose, thick (3 to 4 mm. in diameter), 4 to 6 mm. long; leaf blades thick-coriaceous, elliptic or obovate-elliptic, 9 to 15 cm. long, 4 to 7 cm. broad, attenuate at base, obtuse at apex, entire and revolute at margins, glabrous, pinnate-veined, the secondary

veins ascending, 2 to 4 to a side, with the midvein nearly plane above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary, racemose; rachis rugose, glabrous, 1 to 3 cm. long, bracteate at base with minute deciduous bracts; pedicels about 8 per centimeter, slender (about 0.8 mm. in diameter), 12 to 20 mm. long, striate, deciduously bibracteolate near base, articulate with calyx; calyx cylindric, 6 to 6.5 mm. long (including tube and limb), 3.5 to 4 mm. in diameter, the lobes triangular, apiculate, 0.5 to 1 mm. long, 1.5 to 3 mm. across; corolla red, cylindric, 12 to 19 mm. long, 3 to 5 mm. in diameter, the lobes triangular, acute, 1.5 mm. long; stamens 12 to 18 mm. long; filaments free, 1 to 3 mm. long, pilose at margins above with stiff hairs about 0.3 mm. long, attached to the anther dorsally near its base, leading into narrow elongate connectives; anther sacs slightly granular, 5 to 10 mm. long; tubules erect, slender, flexible, 6 to 9 mm. long, opening by introrse elongate clefts; style about as long as corolla, the stigma truncate; young fruit subspherical, about 6 mm. in diameter, the calyx limb persistent.

Type in the herbarium of the New York Botanical Garden, collected above Bogotá, Department of Cundinamarca, Colombia, altitude 2,700 to 2,800 meters, August 16, 1917, by H. H. Rusby and F. W. Pennell (no. 1290A).

DISTRIBUTION: Andes of Colombia, altitude 1,300 to 3,000 meters.

COLOMBIA.

HUILA: East of Neiva, *Rusby & Pennell* 982 (Y), 983 (F, N, Y).

ANTIOQUÍA: *Jervise* (K). Belmira, Santa Rosa, *Lehmann* 7535 (F, K).

EL VALLE: La Cumbre, *Pennell & Killip* 5802 (B, G, N, Y).

It is surprising that so widely distributed a species has not been previously described. There is no doubt that the above-cited specimens are conspecific, the shiny obovate leaves giving the plant an unmistakable appearance. It may be remarked that the specimens from the Eastern Cordillera have flowers somewhat smaller in all parts than those from the Central and Western Cordilleras. The relation of this species to the preceding has been noted above.

10. *Thibaudia jahnii* Blake, Contr. U. S. Nat. Herb. 20: 529. 1924.

Low shrub; branchlets subterete, nigrescent, glabrous; petioles rugose, 3 to 6 mm. long, glabrous, winged above; leaf blades thick-coriaceous, oblong-ovate, 5 to 8 cm. long, 2 to 3.5 cm. broad, cuneate or subattenuate at base, subacute or short-acuminate at apex, entire and slightly revolute at margins, essentially glabrous, pinnate-veined, the midvein slightly impressed above, prominent beneath, the secondary veins 2 or 3 to a side, ascending, plane above, slightly raised beneath, the veinlets obscurely reticulate; inflorescence axillary, racemose, glabrous in all parts, 10 to 20 flowered; rachis subrugose, 2 to 3 cm. long; pedicels rugose, slender, 8 to 12 mm. long, each subtended by an oblong bractlet about 2 mm. long, bibracteolate near base, swollen distally; calyx limb short-cylindric or campanulate, about 2 mm. long and 2.5 mm. in diameter at anthesis; limb coriaceous, about 2 mm. long including lobes, the lobes short-triangular, less than 1 mm. long; corolla carnose, rigidly cylindric, somewhat rugose, about 12 mm. long and 3 mm. in diameter, the lobes up to 1.5 mm. long; stamens about 10 mm. long; filaments dark castaneous, distinct, glabrous or very sparsely pilose distally, 2 mm. long, leading into long slender connectives; anther sacs nearly smooth, 4 to 5 mm. long; tubules erect, flexible, about as wide as sacs, 4 to 5 mm. long, opening by oval clefts about half as long; stigma peltate.

TYPE LOCALITY: Páramo de Piñango, Venezuela, altitude 2,600 meters. Type collected by Jahn (no. 424).

DISTRIBUTION: Known only from the type collection.

VENEZUELA: Páramo de Piñango, *Jahn*, 424 (N, type).

Closely allied to *T. formosa*, from which it is clearly separable on the characters mentioned in the key. A local name is "coralito."

11. *Thibaudia formosa* Klotzsch; Schomb. Versuch Fauna & Fl. Br. Guian. 1088. 1848.

Psammisia formosa Klotzsch, Linnaea 24: 46. 1851.

Chupalon formosum Kuntze, Rev. Gen. Pl. 2: 383. 1891.

Shrub with stout subterete glabrous branchlets; leaves subsessile or with short stout winged petioles; leaf blades ovate, 7 to 12 cm. long, 3 to 4.5 cm. broad, subacute at apex, attenuate or cuneate at base, entire and slightly revolute at margins, thick-coriaceous, often white-punctate on both surfaces, the lower surface also with less frequent short-stalked glandular hairs, pinnate-veined, the secondary veins arcuate, about 3 to a side, oriented from midvein near its base, raised or nearly plane on both surfaces, the veinlets reticulate, slightly raised above, plane beneath; flowers about 7 to an inflorescence, in axillary racemes; rachis 4 to 10 mm. long; pedicels subterete, 12 to 25 mm. long, dilated at summit, slenderest at base, bracteolate on lower part with several broadly ovate sessile acute bractlets about 0.8 mm. long; calyx campanulate, about 5 mm. long and 5 mm. in diameter at summit, the lobes 1 mm. long; corolla fleshy, cylindric, 8 to 10 mm. long, 2.5 to 3 mm. in diameter at base, with broadly triangular lobes about 1 mm. long; stamens 7.5 to 8.5 mm. long; filaments fleshy, nigrescent, about 1.7 mm. long, sparsely pubescent at their junction with anthers with delicate pale hairs not more than 1 mm. long, coherent at base; anther sacs finely granular, 3 to 4 mm. long; tubules membranous, 3.5 to 4.5 mm. long, with clefts more than half as long; style 9 to 10 mm. long, the stigma flattened, 1 mm. in diameter.

TYPE LOCALITY: Slopes of Mount Roraima, British Guiana. Type collected by Schomburgk (no. 1040).

DISTRIBUTION: Pacaraima Mountains, altitude 1,000 to 1,500 meters.

BRITISH GUIANA: Slopes of Mount Roraima, *Schomburgk* 1040 (B, type).

VENEZUELA.

AMAZONAS: Mount Duida, *Tate* 729 (N, Y), 903 (N, Y).

The name *T. formosa* was originally published without description; three years later Klotzsch described the plant under the generic name *Psammisia*. It is a beautiful sclerophyllous species which should find its way into cultivation, and is to be looked for throughout the mountains between the two extreme localities cited above.

12. *Thibaudia roraimae* Mansf. Notizbl. Bot. Gart. Berlin 9: 437. 1925.

Low shrub; branchlets subterete, glabrous, brownish; petioles rugose, 5 to 10 mm. long, glabrous, narrowly winged; leaf blades thick-coriaceous, broadly ovate or ovate-oblong, 8 to 14 cm. long, 4.5 to 11 cm. broad, cuneate at base, acute at apex, entire and revolute at margins, essentially glabrous, pinnate-veined, the secondary veins 2 or 3 to a side, arcuate-ascending, with the midvein impressed above, prominent beneath, the veinlets reticulate, plane on both surfaces; inflorescence subfasciculate or short-racemose (rachis not more than 1 cm. long), glabrous in all parts, 6 to 10 flowered; pedicels rugose, 12 to 15 mm. long, each subtended by a subcoriaceous oblong bractlet about 2 mm. long, bibracteolate near base, swollen distally; calyx rugose, short-cylindric or broadly campanulate, the tube about 3 mm. long and 5 mm. in diameter, the limb suberect, coriaceous, about 3 mm. long including lobes, the lobes 5 (rarely 6 or 7), acute, about 1 mm. long, membranous-margined at apex, the sinuses rounded; corolla carnose, rigidly cylindric, 7 to 11 mm. long, 3 mm. in diameter;

stamens 7 to 9 mm. long; filaments dark castaneous, distinct, about 2.5 mm. long, pilose dorsally and marginally towards apex with pale hairs up to 0.2 mm. long; anther sacs nearly smooth, 2.5 to 3 mm. long; tubules wide, flexible, 4 to 5 mm. long; stigma peltate.

TYPE LOCALITY: Mount Roraima, British Guiana, altitude 2,100 meters. Type collected by Ule (no. 8715).

DISTRIBUTION: Known only from the type locality.

BRITISH GUIANA: Mount Roraima, *Ule* 8715 (B, type, Go, K); *in Thurn* 49, in part (K, N).

This species and the two preceding are doubtless closely related, but they are easily distinguished from one another on the character of leaf shape.

13. *Thibaudia apophysata* Hoer. Bot. Jahrb. Engler 42:314. 1909.

Shrub about 2 meters high; branchlets subterete, slender, castaneous, glabrous; petioles rugose, 1 to 3 mm. long, narrowly winged, glabrous; leaf blades thick-coriaceous, oblong, 6 to 7 cm. long, 1.5 to 2.5 cm. broad, attenuate at base, subacute at apex, slightly revolute and shallowly crenate at margins, glabrous, pinnate-veined, the secondary veins usually 3 to a side, with the midvein slightly impressed above, raised beneath, the veinlets obscure; inflorescence short-racemose, glabrous in all parts, 6 to 10 flowered; rachis and pedicels rugose, violaceous, the rachis about 2 cm. long, the pedicels 18 to 26 mm. long, each subtended by a minute deciduous bractlet, bibracteolate near base (bractlets ovate, acute, about 2 mm. long), swollen distally and obscurely articulate with calyx; calyx rigidly coriaceous, rugose, the tube strongly apophysate, about 1.5 mm. long and 5 to 6 mm. in diameter at anthesis, the limb about 2 mm. long including lobes, the lobes broadly deltoid, about 1 mm. long and 4 mm. across, the sinuses flattened; corolla rigidly coriaceous, short-cylindric, 7 to 9 mm. long and about 4 mm. in diameter; filaments nigrescent or castaneous, coherent at base, free distally, about 2 mm. long, sparsely pilose at margins distally, leading into strong nigrescent connectives; anther sacs slightly granular, about 3 mm. long; tubules flexible, about 2.5 mm. long, opening by large oval clefts; style stout, the stigma truncate.

TYPE LOCALITY: Huacapistana, Department of Junín, Peru, altitude 2,600 to 3,000 meters. Type collected by Weberbauer (no. 2071).

DISTRIBUTION: Known only from the type collection.

PERU.

JUNÍN: Huacapistana, *Weberbauer* 2071 (B, type).

The present species apparently has no close relatives, being quite unrelated to the preceding group from the Pacaraima Mountains, with which it is artificially keyed. In many respects (aspect of foliage, inflorescence, and external appearance of flowers) it is suggestive of such species of *Psammisia* as *P. lehmannii*.

14. *Thibaudia cupatensis* Huber, Bol. Mus. Goeldi 7:304. 1913.

Scandent epiphytic shrub; branches and branchlets subterete, cinereous, glabrous; petioles shallowly grooved above, stout (about 2.5 mm. in diameter), 5 to 7 mm. long, glabrous; leaf blades coriaceous, oblong-ovate, 7 to 10 cm. long, 4 to 5 cm. broad, rounded or subcuneate at base, obtuse at apex, shallowly crenate at margins, glabrous, pinnate-veined, the midvein slightly impressed above, prominent beneath, the secondary veins arcuate-ascending, about 4 to a side, plane above, slightly raised beneath, the veinlets copiously reticulate, plane; inflorescence subfasciculate or short-racemose, 8 to 12 flowered; rachis stout, 3 to 5 mm. long, glabrous; pedicels flexuose, 5 to 7 mm. long, each subtended by a coriaceous ovate bractlet 1.5 mm. long, bibracteolate at

middle; calyx tube short-cylindric or subspherical, 2 mm. long and 2.5 mm. in diameter at anthesis, faintly and deciduously puberulent; limb about 1.5 mm. long including lobes, the lobes apiculate, 0.5 mm. long and 2 mm. across base; corolla minutely puberulous, cylindric, 10 to 12 mm. long, about 4 mm. in diameter, the lobes acute, 1 mm. long; stamens about 9 mm. long; filaments free, stout, about 2.5 mm. long, narrowed above, marginally pubescent above with stiff brown hairs, the connectives slender, alternately equipped with very minute vestigial spurs (as *Psammisia*); anther sacs smooth, about 3 mm. long; tubules erect, wide, flexible, about 5 mm. long, opening by introrse clefts about half their length.

TYPE LOCALITY: Cupati, Río Caquetá, Intendencia of Caquetá, Colombia. Type collected by Ducke (no. 12275).

DISTRIBUTION: Known only from the type collection.

COLOMBIA.

CAQUETÁ: Cupati, Río Caquetá, *Ducke* 12275 (N, type collection).

This is the only species of *Thibaudia* known to me which bears psammisioid spurs on the connectives. In all other respects it is a true *Thibaudia* and is certainly best left in this genus.

15. *Thibaudia glandulifera* A. C. Smith, Bull. Torrey Club 58: 439. 1931.

Straggling shrub about 1 meter high; branchlets grayish, glabrous or sparsely pubescent with deciduously glandular hairs; leaf blades thick-coriaceous, ovate, 2 to 3.5 cm. long, 12 to 18 mm. broad, glabrous or sparsely white-punctate or sparsely pubescent on both surfaces with minute black hairs, subacute at apex, entire or bluntly serrate at margins, rounded or cuneate at base to a thick petiole 2 to 3 mm. long, pinnate-veined, the midvein impressed above, raised beneath, the secondary veins about 3 to a side, arcuate, obscure or faintly raised on both surfaces, the veinlets reticulate, obscure or plane; flowers fasciculate in groups of about 5, the fascicles axillary near ends of branchlets; pedicels slender, striate, 10 to 13 mm. long, pubescent with close minute short pale hairs (0.1 mm. long) and also with scattered erect ferruginous glandular hairs (0.9 to 1.5 mm. long), with a few triangular acute sessile bractlets near base; calyx campanulate, pubescent with glandular hairs, about 4 mm. long and 4 mm. in diameter at summit; corolla cylindric, somewhat carnose, glabrous, 12 to 13 mm. long, 2 to 3 mm. in diameter at base; stamens 9 to 10 mm. long; filaments 3.5 to 5 mm. long, sparsely pilose distally, loosely connate at base; anther sacs granular, about 1.5 mm. long; tubules membranous, about 4.7 mm. long; style about 10 mm. long, the stigma hemispherical; fruit subspherical, 6 mm. or more in diameter, retaining pubescence of calyx.

TYPE LOCALITY: Summit of Mount Duida, State of Amazonas, Venezuela, altitude about 1,925 meters. Type collected by G. H. H. Tate (no. 409).

DISTRIBUTION: Known only from Mount Duida, altitude 1,700 to 2,000 meters.

VENEZUELA.

AMAZONAS: Summit of Mount Duida, *Tate* 409 (Y, type), 457 (Y).

This species and the three following are all closely allied, but are separable on the characters mentioned in the key. They form a group which must have been long isolated from the Andean species. Doubtless other species of this affinity await collection in the Pacaraima Mountains. The present species is well marked from the other three by the glandular hairs of its pedicels and calyces. Possibly two other specimens from Mount Duida (*Tate* 754 and 755) should be included here, but they have larger leaves of a slightly different

texture. Since they are in fruit, it can not be said whether they are really distinct from this species.

16. *Thibaudia involucrata* A. C. Smith, Bull. Torrey Club 58: 440. 1931.

Low shrub; branchlets subterete, glabrous; petioles stout, about 5 mm. long, winged nearly to base; leaf blades thick-coriaceous, broadly ovate, 3.5 to 7 cm. long, 2 to 4 cm. broad, obtuse or subacute at apex, cuneate at base, entire or shallowly serrate at margins, slightly revolute, sparsely black-punctate on both surfaces, pinnate-veined, the midvein impressed above, prominent beneath, the secondary veins 3 to 5 to a side, arcuate or spreading, plane above, raised beneath, the veinlets reticulate, obscure above, raised beneath; flowers in axillary fascicles, 3 to 5 to an inflorescence, each fascicle circumscribed by a few subcoriaceous, triangular, obtuse, faintly ciliate bracts about 1 mm. long; pedicels, involucre, calyces, and corollas finely puberulent with minute pale hairs; pedicels subterete, stout, 3 to 5 mm. long, surmounted by persistent involucre of 2 coriaceous keeled acute fused bracts 1 to 2 mm. long; calyx tube subcylindric, about 2 mm. long, the limb about 1.5 mm. long, the lobes about 1 mm. long; corolla fleshy, cylindric, 7 to 8 mm. long, about 2.5 mm. in diameter at base; stamens 5 to 6 mm. long; filaments about 2.5 mm. long, sparsely pilose distally, loosely connate at base; anther sacs finely granular, about 1.2 mm. long; tubules membranous, about 3 mm. long, opening by introrse clefts; stigma flattened; fruit spherical, 3 to 4 mm. in diameter, coriaceous, the calyx persistent.

TYPE LOCALITY: Summit of Mount Duida, State of Amazonas, Venezuela, altitude 1,850 meters. Type collected by G. H. H. Tate (no. 525).

DISTRIBUTION: Known only from Mount Duida, altitude 1,850 to 1,900 meters.

VENEZUELA.

AMAZONAS: Summit of Mount Duida, *Tate* 525 (Y, type), 694 (N, Y).

Closely allied to the following, but unique in its two fused bractlets surmounting the pedicel.

17. *Thibaudia nutans* Klotzsch; Schomb. Versuch Fauna & Fl. Br. Guian. 1088. 1848, nomen; Mansf. Notizbl. Bot. Gart. Berlin 9: 438. 1925.

Ceratostema nutans Niedenzu, Bot. Jahrb. Engler 11: 224. 1889, nomen.

Psammisia coriacea N. E. Brown, Trans. Linn. Soc. Bot. II. 6: 42. 1901. Not

Thibaudia coriacea Blume, 1825-26.

Ceratostema ulei Mansf. Notizbl. Bot. Gart. Berlin 9: 438. 1925.

Low shrub; branchlets subterete, glabrous, cinereous; petioles rugose, 3 to 8 mm. long, glabrous, angled above; leaf blades thick-coriaceous, ovate, 3 to 10 cm. long, 2.5 to 6 cm. broad, cuneate or rounded at base, rounded or subacute at apex, entire at margins, glabrous, olivaceous or brownish, pinnate-veined, the midvein slightly impressed above, raised beneath, the secondary veins close, 3 to 5 to a side, nearly plane on both surfaces, the veinlets reticulate, obscure above, plane or slightly raised beneath; inflorescence axillary, subfasciculate, glabrous in all parts, 2 to 6 flowered; pedicels rugose, 5 to 15 mm. long, each subtended by an ovate bract 1 to 2 mm. long, bibracteolate near middle, slightly swollen distally; calyx rugose, the tube campanulate, 1.5 to 3 mm. long, 2 to 3 mm. in diameter at anthesis, the limb suberect, 1.5 to 3 mm. long including lobes, the lobes 4 to 6, often in a state of semi-fusion, acute, about 1.5 mm. long; corolla cylindric, glabrous or sparsely farinose, 8 to 14 mm. long, 3 to 5 mm. in diameter, the lobes 5 or 6, 1.5 to 2 mm. long; stamens 10 or 12, equal, 6 to 10 mm. long; filaments dark castaneous, distinct, slender, glabrous or very sparsely pilose distally, 3 to 5 mm. long; anther sacs smooth, 2 to 2.5 mm. long; tubules wide, flexible,

distinct to base, 3 to 4 mm. long, opening by elongate clefts about half their length; style striate, the stigma peltate.

TYPE LOCALITY: Mount Roraima, British Guiana, altitude 1,600 meters. Type collected by Schomburgk (no. 873).

DISTRIBUTION: Highlands of western British Guiana, and westward along the Brazilian-Venezuelan Boundary, altitude 800 to 1,800 meters.

BRITISH GUIANA: *Schomburgk* (K). Kaieteur Savanna, *Jenman* 1031 (K); *im Thurn* (K). Mount Roraima and vicinity, *Schomburgk* 566 (K), 873 (B, type), 567/873 (K), 924 (B); *im Thurn* 56 (K, N); *Ule* br. 40 (B, type of *Ceratostema ulei*), 8719 (B, Go); *Tate* 284 (Y), 402 (Y); *McConnell & Quelch* 662 (K, type of *Psammisia coriacea*).

BRAZILIAN-VENEZUELAN BOUNDARY: Western foothills of Serra Imeri, near Salto de Huá, *Holt & Blake* 499 (N, Y).

Among the above-cited specimens there is a good deal of variation in leaf size, the smallest leaves being found in the *Ule* specimens. However, there is no justification for recognizing more than one species among the specimens I have seen.

This species was not actually described by Klotzsch, the first complete description being by Mansfeld, who failed to note its identity with the *Ule* collection.

18. *Thibaudia truncata* A. C. Smith, Bull. Torrey Club 58: 440. 1931.

Low shrub; branchlets terete, glabrous; petioles about 4 mm. long, stout; leaf blades thick-coriaceous, ovate, 3 to 4.5 cm. long, 2 to 3 cm. broad, glabrous, sometimes sparsely punctate on both surfaces, subacute at apex, rounded at base, entire and plane at margins, decurrent on petiole, pinnate-veined, the midvein impressed above, raised beneath, the secondary veins 3 or 4 to a side, spreading, obscure above, plane or slightly raised beneath, the veinlets reticulate, obscure; flowers axillary, apparently solitary, finely puberulent on all exterior surfaces with minute pale hairs; pedicels striate, slender, 9 to 10 mm. long, with 2 or 3 triangular acute sessile bractlets on the lower half; calyx campanulate, slightly constricted at summit of tube, about 3 mm. long, 4 mm. in diameter at summit, with 5 minute apiculate teeth; corolla somewhat fleshy, cylindric, 10 mm. long, 2 to 3 mm. in diameter at middle; stamens about 9 mm. long; filaments about 3.5 mm. long, faintly pilose distally, loosely connate at base; anther sacs finely granular, about 2 mm. long, the tubules membranous, about 4 mm. long; stigma peltate.

TYPE LOCALITY: Summit of Mount Duida, State of Amazonas, Venezuela, altitude about 2,200 meters. Type collected by G. H. H. Tate (no. 602).

DISTRIBUTION: Known only from the type collection.

VENEZUELA.

AMAZONAS: Summit of Mount Duida, *Tate* 602 (Y, type).

This species is distinct from the preceding on the basis of its truncate calyx limb and pale puberulous flowers.

19. *Thibaudia laxa* A. C. Smith, sp. nov.

Frutex gracilis; ramis ramulisque laxis glabrescentibus; laminis ovato-oblongis basi subcordatis vel rotundatis apice longe acuminatis 3-nerviis; inflorescentia laxe racemosa molliter pilosa; calyce prismaticeo 5-angulato; corolla cylindrico-urceolata; staminibus aequalibus, filamentis distinctis superne pilosis, tubulis flexilibus quam loculis longioribus.

Shrub about 3 meters high with lax branches; branchlets subterete, glabrous or sparsely puberulous; petioles about 2 mm. long, essentially glabrous; leaf blades subcoriaceous, ovate-oblong, 4 to 6 cm. long, 1.5 to 2.5 cm. broad, subcordate

or rounded at base, long-acuminate at apex, entire at margins, essentially glabrous (sparsely hispid on midnerve beneath), 3-plexi-nerved, the second and third nerves extending about halfway to apex, the midnerve impressed above, prominent beneath, with several secondary nerves; inflorescence racemose; rachis slender, subterete, 1.5 to 2 cm. long, soft-pilose (hairs pale, spreading, about 0.15 mm. long), circumscribed at base by numerous ovate bractlets up to 2 mm. long; pedicels slender (about 0.3 mm. in diameter), 14 to 20 mm. long, striate, pilose as the rachis, each subtended by a lanceolate subpilose bractlet about 2 mm. long and bibracteolate towards base; calyx prismatic, 5-angled (angles opposite the sinuses), pilose as the pedicels, the tube 3 mm. long and 4 mm. in diameter, the limb spreading, about 2 mm. long including lobes, the lobes triangular, acute, 1.5 mm. long, 2 mm. across base; corolla rose-red, sericeous (hairs pale, about 0.2 mm. long), cylindric-urceolate, 6 to 8 mm. long, 3 to 4 mm. in diameter near base, the lobes triangular, about 1 mm. long; stamens equal, 5 to 6.5 mm. long; filaments free, about 2 mm. long, stiff-pilose above (hairs about 0.3 mm. long), attached to the anther dorsally near its base; anther sacs smooth, 2 to 2.5 mm. long; tubules erect, wide, flexible, 3 to 3.5 mm. long, opening by distal introrse elongate pores up to 2 mm. long; style about 0.2 mm. in diameter, the stigma peltate.

Type in the herbarium of the Field Museum of Natural History, no. 562,442, collected at Putis, Choimacota Valley, Department of Ayacucho, Peru, altitude 3,200 meters, February 27 to March 12, 1926, by A. Weberbauer (no. 7532).

DISTRIBUTION: Peru, probably limited to the southern part.

PERU(?): Cuitoc, about 3,000 meters, *Pearce* (K).

This is an isolated species, in habit suggesting *Themistoclesia*, but on the basis of its flower structure it is best placed in *Thibaudia*. Its distinguishing features are the slender lax branchlets with truncate-based leaves, the short racemose flowers, and the slender elongate pedicels.

20. *Thibaudia costaricensis* Hoer. Bot. Jahrb. Engler 42: 311. 1909.

Psammisia rhododelphis K. Schum.; Wercklé, Bol. Fomento Costa Rica 1: 934. 1911, nomen.

Low shrub with elongate branches, usually epiphytic; branchlets terete, cinereous, glabrous; petioles subterete, slightly rugose, 3 to 5 mm. long, winged above, glabrous; leaf blades chartaceous or thin-coriaceous, oblong or lanceolate-oblong, 12 to 20 cm. long, 3.5 to 5 cm. broad, cuneate at base, caudate-acuminate at apex, entire and slightly revolute at margins, glabrous, 5-plexi-nerved, the secondary nerves oriented near base, with the midnerve impressed above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary, copious, racemose, 15 to 30 flowered; rachis slender, 2 to 5 cm. long, frequently with a few secondary branches nearly as long, laxly and sparsely puberulous or glabrous; pedicels subterete, 10 to 16 mm. long, dull red, glabrous or puberulous as the rachis, each subtended by a minute deciduous bractlet, deciduously bibracteolate near base, swollen distally; calyx rugose, sparsely puberulous or glabrous, the tube campanulate, about 2 mm. long and 2.5 mm. in diameter at anthesis, the limb 1 to 2 mm. long including lobes, the lobes acute, 0.5 to 1 mm. long, sometimes cartilaginous; corolla 9 to 10 mm. long, cylindric, 3 to 3.5 mm. in diameter, slightly contracted at throat, the lobes about 1 mm. long; stamens about 7 mm. long, equal or subequal; filaments castaneous, membranous, firmly connate in a tube, glabrous, 3 mm. long, leading into slender connectives; anther sacs smooth, 2 mm. long; tubules wide, flexible, distinct to base, about 3 mm. long, opening by oval clefts about half their length; stigma broadly peltate.

TYPE LOCALITY: La Palma, Province of San José, Costa Rica, altitude 1,500 meters. Type collected by Wercklé (no. 20).

DISTRIBUTION: Mountains of Costa Rica, altitude 1,400 to 1,600 meters.

COSTA RICA: Wercklé (?) 3 (B).

SAN JOSÉ: La Palma, Wercklé 20 (B, type), 52 (B); Standley 33002 (N), 38053 (N), 38072 (N).

CARTAGO: El Muñeco, on Río Navarro, Standley & Torres 51292 (N), 51376 (N).

This species, with the three following, forms a very distinct group. It is the only *Thibaudia* found in Central America; with its large leaves and beautiful paniculate inflorescence it would be an excellent plant for cultivation.

21. *Thibaudia paniculata* A. C. Smith, sp. nov.

Frutex vel arbor parva; laminis subbullatis ovato-oblongis basi rotundatis apice abrupte caudato-acuminatis 5 ad 7 pli-nerviis; inflorescentia paniculata multiflora glabra; calyce campanulato rugoso 5-lobato; corolla cylindrica; staminibus subaequalibus, filamentis connatis glabris, tubulis flexilibus loculos subaequantibus.

Shrub or small tree; branchlets terete, slender, glabrous, stramineous, somewhat flexuose; petioles subterete, rugose, 5 to 7 mm. long, glabrous; leaf blades thin-coriaceous, somewhat bullate, ovate-oblong, 11 to 15 cm. long, 5 to 8 cm. broad, rounded at base, abruptly caudate-acuminate at apex (acumen about 1.5 cm. long), entire and narrowly revolute at margins, glabrous, 5 to 7 nerved from the base, the principal nerves impressed above, strongly prominent beneath, the veinlets reticulate, slightly raised above, prominent beneath; inflorescence axillary, paniculate, many-flowered, essentially glabrous in all parts; primary rachis 3 to 4 cm. long, subterete, rugose; secondary branches of the inflorescence about 15, spreading, 2 to 4 cm. long, each subtended by an ovate fimbriate bract about 3 mm. long; pedicels subterete, rugose, flexuose, 10 to 13 mm. long, each bracteate at base and bibracteolate slightly below middle, obscurely articulate with calyx; calyx tube campanulate, rugose, 1 to 1.5 mm. long, 2.5 to 3 mm. in diameter at anthesis; limb 2 to 2.5 mm. long including lobes, the lobes acute, about 1 mm. long and 2 mm. broad, the sinuses rounded; corolla subcarnose, cylindric, 13 to 16 mm. long, 3 to 4 mm. in diameter, the lobes small, triangular; stamens about 10.5 mm. long, alternately slightly unequal; filaments submembranous, castaneous, firmly connate in a tube, glabrous, about 3.5 mm. long, leading into slender connectives; anther sacs slightly granular, about 4 mm. long; tubules wide, flexible, about 4 mm. long, opening by large oval clefts nearly as long; style flexuose, the stigma broadly peltate, 1 mm. in diameter.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected at Timbiquí, Department of El Cauca, Colombia, in 1903, by F. C. Lehmann (no. K176).

DISTRIBUTION: Known only from the type collection.

A handsome plant, related to the preceding, but separable on leaf characters and flower size. The leaves are abruptly caudate-acuminate and noticeably bullate, and the flowers are larger than those of *T. costaricensis*.

22. *Thibaudia archeri* A. C. Smith, sp. nov.

Frutex subscandens; ramis ramulisque glabris fuscis; laminis oblongis basi cuneatis apice subacutis vel breviter acuminatis 7-pli-nerviis; inflorescentia paniculata robusta multiflora subglabra; calyce campanulato 5-lobato; corolla tenuiter carnosa cylindrica; staminibus aequalibus, filamentis connatis glabris, tubulis membranaceis quam loculis paullo brevioribus.

Subscandent shrub about 5 meters high; branches and branchlets terete, stiff, stout, glabrous, brownish; petioles stout, rugose, glabrous, 8 to 13 mm. long; leaf blades coriaceous, olivaceous, glabrous, oblong, 18 to 22 cm. long, 5 to 6.5 cm. broad, cuneate at base, subacute or bluntly short-acuminate at apex, entire at margins, 7-plex-nerved, the principal nerves oriented near base, plane or slightly raised above, prominent beneath, the veinlets reticulate, obscure; inflorescence from older parts of branchlets, paniculate, many-flowered, minutely and sparsely strigose on external surfaces when young, becoming essentially glabrous; primary rachis slightly angled, stout, 2 to 4 cm. long; secondary branches of inflorescence about 12, widely spreading, 2 to 6 cm. long, each subtended by an ovate submembranous bract about 2 mm. long; pedicels striate, 9 to 16 mm. long, swollen distally, each subtended by a small bract and minutely bibracteolate at middle, articulate with calyx; calyx tube campanulate, about 1.5 mm. long and 3 mm. in diameter at anthesis; limb about 2 mm. long including lobes, the lobes triangular, about 1 mm. long, the sinuses rounded; corolla thin-carnose, 12 to 17 mm. long at maturity, 3 to 4 mm. in diameter, the lobes small, triangular, obtuse; stamens equal, 10 to 11 mm. long; filaments membranous, pale, glabrous, firmly connate in a tube and adherent to corolla at base, 5 to 6 mm. long; anther sacs narrowed at base, 4 mm. long; tubules membranous, flexible, 2.5 to 3 mm. long; stigma broadly peltate.

Type in the U. S. National Herbarium, no. 1,499,338, collected at La Concepción, Department of El Chocó, Colombia, April 30, 1931, by W. A. Archer (no. 2013).

DISTRIBUTION: Known only from the type collection.

In floral characters this species is practically identical with *T. paniculata*, from which it differs by having the leaves narrower in proportion, cuneate rather than rounded at base, and decidedly not bullate. In common with *T. paniculata*, the present species has flowers larger than those of *T. costariensis*, from which it is distinguished also by its larger leaves and more robust inflorescence. The three species are very closely allied.

EXPLANATION OF PLATE 12.—*Thibaudia archeri*, from photograph of type sheet. One-half natural size.

23. *Thibaudia pennellii* A. C. Smith, sp. nov.

Frutex; laminis oblongis vel ovato-oblongis basi cuneatis apice acutis subtus parce pilosis glabrescentibus 5 ad 7 pli-nerviis; inflorescentia racemosa constanter ubique pubescente; calyce campanulato 5-lobato; corolla tenuiter carnosae subcylindrica; filamentis connatis dense pilosis, tubulis loculos subaequantibus.

Shrub; branchlets subterete, stout, puberulous or glabrous, cinereous; petioles subrugose, 6 to 11 mm. long, slightly puberulous or glabrous; leaf blades thick-coriaceous, oblong or ovate-oblong, 14 to 17 cm. long, 4.5 to 5.5 cm. broad, cuneate at base, acute at apex, entire and slightly revolute at margins, glabrous above, sparsely pilose beneath, with minute appressed hairs about 3 per square millimeter of surface, becoming glabrous, 5 to 7 pli-nerved, the secondary nerves oriented near base or slightly above, with midnerve nearly plane above, prominent beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary, racemose, 10 to 15 flowered; rachis angled, 1.5 to 4 cm. long, regularly and persistently pubescent with pale spreading hairs up to 0.3 mm. long, circumscribed at base by numerous imbricate coriaceous oblong acute bracts up to 10 mm. long; pedicels striate, 6 to 10 mm. long, pubescent as the rachis, each subtended by a minute bractlet and minutely bibracteolate at middle, slightly swollen distally; calyx tube subcylindric or campanulate, 2.5 mm. long and 2.5 mm. in diameter at anthesis, sparsely pilose

with pale hairs about 0.2 mm. long; limb 1.5 to 2 mm. long including lobes, the lobes apiculate, about 1 mm. long; corolla subcylindric, thin-carnose, about 18 mm. long, 2.5 mm. in diameter, sparsely pilose with pale yellow hairs up to 0.3 mm. long, the lobes triangular, about 1 mm. long; stamens 8 to 9 mm. long; filaments castaneous, submembranous, firmly connate in a tube 2 mm. long, densely pilose distally dorsally with pale brown ascending hairs 0.3 mm. long; anther sacs nearly smooth, about 4 mm. long, narrowed and setose at base; tubules wide, flexible, 3 to 4 mm. long, opening by oval clefts nearly as long; stigma truncate.

Type in the herbarium of the New York Botanical Garden, collected in forest at Murillo, Department of Tolima, Colombia, altitude 2,100 to 2,500 meters, December 18, 1917, by F. W. Pennell (no. 3179). Duplicate in the U. S. National Herbarium.

DISTRIBUTION: Known only from the type collection.

This species, which is without close relatives, is sharply distinguished from the two preceding by the uniform pubescence of its flowers.

24. *Thibaudia parvifolia* (Benth.) Hoer. Bot. Jahrb. Engler 42:275. 1909.

Ceratostema parvifolium Benth. Pl. Hartw. 220. 1846.

Eurygania parvifolia Benth. & Hook. Gen. Pl. 2:568. 1876.

Low shrub; branches and branchlets subterete, cinereous or brownish, glabrous or minutely puberulous; petioles subterete, rugose, nigrescent, glabrous, about 2 mm. long; leaf blades oblong, 14 to 18 mm. long, about 5 mm. broad, rounded or broadly cuneate at base, subacute at apex, strongly revolute and crenate at margins, glabrous, rigidly coriaceous, obscurely pinnate-veined, the midvein impressed-sulcate above, raised beneath, the secondary veins 2 or 3 to a side, spreading, usually obscure; inflorescence axillary, near ends of branchlets, fasciculate; flowers 1 or 2 to an inflorescence; pedicels strongly rugose, 5 to 8 mm. long, glabrous, subtended at base by 2 or 3 minute ovate bractlets; calyx coriaceous, rugose, glabrous, the tube cylindric, about 2.5 mm. long, 1.5 to 2 mm. in diameter at anthesis, the limb suberect, 3 to 3.5 mm. long including lobes, the lobes 4 or 5, ovate, apiculate, about 2 mm. long and 2.5 mm. broad; corolla cylindric, subrugose, glabrous or minutely puberulous, 17 to 19 mm. long, 3 to 4 mm. in diameter, the lobes oblong, about 2 mm. long; stamens about 13 mm. long; filaments dark castaneous, about 4 mm. long, firmly connate in a tube, pilose at margins distally with hairs about 0.2 mm. long, continued into slender connectives; anther sacs nearly smooth, about 4.5 mm. long; tubules wide, flexible, about 5.5 mm. long, opening by clefts about half as long; stigma truncate.

TYPE LOCALITY: Near Laguna de Guanacas, Department of El Cauca, Colombia, altitude about 3,700 meters. Type collected by Hartweg (no. 1208).

DISTRIBUTION: Known only from the type collection.

COLOMBIA.

EL CAUCA: Near Laguna de Guanacas, *Hartweg* 1208 (K, type).

A low compact sclerophyllous shrub, distinguishable as suggested in the key.

25. *Thibaudia tomentosa* Hoer. Bot. Jahrb. Engler 42:312. 1909.

Shrub, about 2 meters high; branches and branchlets subterete, covered with a loose, brownish, deciduously pilose bark; petioles subterete, rugose, 2 to 3 mm. long, pale pilose; leaf blades narrowly oblong, 2.5 to 3.5 cm. long, less than 1 cm. broad, attenuate at base, rounded at apex, strongly revolute and crenate at margins, deciduously pilose on both surfaces (hairs pale, up to 0.5 mm. long), pinnate-veined, the midvein impressed-sulcate above, prominent beneath, the secondary veins 2 or 3 to a side, obscure; inflorescence copious

near ends of branchlets, short-racemose, densely tomentose in all parts (hairs pale, matted, about 0.5 mm. long), 6 to 12 flowered; rachis subrugose, about 1 cm. long; pedicels striate, 6 to 10 mm. long, each subtended by an ovate bractlet less than 1 mm. long, deciduously bibracteolate near base; calyx tube campanulate, about 1.5 mm. long and 2 mm. in diameter; limb about 2.5 mm. long including lobes, the lobes 1 to 2 mm. long, about 2.5 mm. broad; corolla subcarnose, cylindric, 12 to 13 mm. long, 3 to 3.5 mm. in diameter, the lobes about 1 mm. long, sparsely short-pilose within; stamens 8.5 to 9 mm. long; filaments castaneous, loosely connate, about 2 mm. long, densely pilose distally with hairs about 0.5 mm. long, continued into slender connectives; anther sacs nearly smooth, about 2.5 mm. long, sparsely pilose at base; tubules flexible, about 5 mm. long, opening by clefts about half as long; stigma truncate.

TYPE LOCALITY: Molinopampa, east of Chachapoyas, Department of Amazonas, Peru, altitude 2,300 to 2,400 meters. Type collected by Weberbauer (no. 4374).

DISTRIBUTION: Known only from the type collection.

PERU.

AMAZONAS: Molinopampa, east of Chachapoyas, *Weberbauer* 4374 (B, type).

The densely tomentose inflorescence of this species is approached only by that of *T. anomala*.

26. *Thibaudia anomala* A. C. Smith, sp. nov.

Frutex compactus; laminis ovato-oblongis basi cuneatis apice subacutis margine subserratis obscure 3-nerviis; inflorescentia subfasciculata basi bracteis magnis deciduis instructa; calyce dense tomentoso, limbo erecto quam tubo duplo longiore 5-lobato, lobis elongato-triangularibus; corolla cylindrica extus tomentosa intus glabra; staminibus aequalibus, filamentis connatis ad margines pilosis, tubulis flexilibus quam loculis duplo brevioribus.

Shrub; branches and branchlets stout, subterete, clothed with a deciduous glabrous nigrescent bark; petioles rugose, narrowly angled, 2 to 3 mm. long, glabrous; leaf blades ovate-oblong, 2.5 to 3.5 cm. long, 1 to 1.5 cm. broad, cuneate or subattenuate at base, acute or subacute at apex, shallowly crenate-serrate at margins, glabrous above, deciduously sparsely pilose beneath with minute brown hairs, obscurely 3-nerved from base, the midnerve slightly impressed above, raised beneath, with 2 or 3 obscure lateral nerves; inflorescence axillary near ends of branchlets, subfasciculate, 3 to 6 flowered, circumscribed at base by several deciduous cavendishoid bracts up to 1 cm. long; pedicels striate, about 1 cm. long, spreading-pilose with pale stiff hairs about 0.7 mm. long, deciduously bibracteolate near base, obscurely articulate with calyx; calyx densely tomentose, especially towards base, with yellowish hairs like those of the pedicel, the tube short-cylindric, 2.5 to 3 mm. long, 2 mm. in diameter at anthesis, the limb erect, thin-coriaceous, 7 mm. long including lobes, the lobes elongate-triangular, acute, about 3 mm. long and 1.5 mm. across; corolla tomentose as the calyx, thin-carnose, cylindric, 10 to 11 mm. long, 2.5 to 3 mm. in diameter, glabrous within, the lobes triangular, about 1 mm. long; stamens about 7 mm. long; filaments castaneous, submembranous, about 2 mm. long, firmly connate in a tube, densely pilose at margins distally with hairs up to 0.4 mm. long, continued into slender connectives; anther sacs nearly smooth, produced at base into a caudate tip, 4 mm. long; tubules flexible, 2 mm. long, opening by clefts about half as long; stigma peltate.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected in Colombia or Ecuador by E. André.

DISTRIBUTION: Doubtful, the type specimen being without definite data.

It is unfortunate that this peculiar little plant is so completely without data. It is not closely allied to any other species of *Thibaudia*, being unique in its long erect calyx limb and its comparatively large bracts. These characters suggest certain species of *Cavendishia*, but in staminal structure our plant is certainly a *Thibaudia*.

27. *Thibaudia phyllireaefolia* Dun.; DC. Prodr. 7:564. 1839.

Eurygania phyllireaefolia Benth. & Hook. Gen. Pl. 2:568. 1876.

Low shrub; branchlets terete, loosely clothed with a cinereous deciduously puberulous bark; petioles subrugose, pilose as the young branchlets, 2 to 3 mm. long; leaf blades narrowly oblong, 3 to 4 cm. long, about 1 cm. broad, narrowly cuneate or attenuate at base, obtuse at apex, crenate-serrate at margins (serrations 4 or 5 per centimeter), essentially glabrous (sometimes on both surfaces pilose with a few lax pale hairs and also with a few stiff brown appressed hairs), pinnate-veined, the midvein slightly impressed above, raised beneath, the secondary veins 2 or 3 to a side, spreading, obscure; inflorescence axillary near ends of branchlets, subfasciculate or short-racemose (rachis not more than 5 mm. long), 4 to 8 flowered; flowers pilose in all parts with spreading yellowish hairs about 0.5 mm. long; pedicels rugose, 5 to 8 mm. long, circumscribed at base by a few ovate bracts 2 to 3 mm. long, bibracteolate near base, obscurely articulate with calyx; calyx tube rugose, campanulate, 2 to 2.5 mm. long, 2.5 to 3 mm. in diameter at anthesis; limb 2.5 to 3 mm. long including lobes, the lobes ovate, apiculate, 1 to 1.5 mm. long, 2.5 mm. across; corolla thin-carnose, 15 to 16 mm. long, about 4 mm. in diameter, 5 or 6 lobed, the lobes about 2 mm. long; stamens 9 to 10 mm. long; filaments castaneous, submembranous, about 4 mm. long, firmly connate in a tube, densely pilose at distal margins with hairs up to 0.5 mm. long, continued into slender connectives; anther sacs nearly smooth, about 4 mm. long; tubules flexible, 4 mm. long; stigma peltate.

TYPE LOCALITY: Chachapoyas, Department of Amazonas, Peru. Type not cited.

DISTRIBUTION: Known only from the type locality.

PERU.

AMAZONAS: Chachapoyas, *Mathews* (K), 3041 (K, in part, type collection?).

28. *Thibaudia moricandi* Dun.; DC. Prodr. 7:563. 1839.

Shrub; branchlets subterete, brownish, short-pilose, becoming glabrous; petioles subrugose, essentially glabrous, 2 to 4 mm. long; leaf blades lanceolate-oblong, 4 to 5 cm. long, 1 cm. broad, cuneate at base, acute at apex, crenate-serrate at margins (serrations 3 or 4 per centimeter), glabrous, pinnate-veined, the midvein slightly impressed above, prominent beneath, the secondary veins obscure, 3 or 4 to a side, spreading; inflorescence axillary near ends of branchlets, subfasciculate or short-racemose (rachis not more than 5 mm. long), 3 to 6 flowered; pedicels subterete, 8 to 13 mm. long, spreading-pilose with pale hairs about 0.3 mm. long, circumscribed at base by a few broadly ovate bracts about 1 mm. long, deciduously bibracteolate near base, slightly swollen distally; calyx subrugose, pubescent as the pedicels, the tube short-cylindric, 2 mm. long and 3 mm. in diameter at anthesis, the limb about 3 mm. long including lobes, the lobes 5, often more or less fused, acute, about 1.5 mm. long; corolla subcylindric, 13 to 14 mm. long, about 4 mm. in diameter, glabrous, the lobes about 1.5 mm. long; stamens 10 to 11 mm. long; filaments dark castaneous, 3 to 3.5 mm. long, firmly connate in a tube about 2 mm. long, densely pilose at margins distally with pale hairs 0.5 mm. long, continued into slender

connectives; anther sacs smooth, 4 mm. long, narrowed at base; tubules wide, 5 to 5.5 mm. long, opening by oval clefts nearly half as long; stigma truncate.

TYPE LOCALITY: Peru. Type collected by Mathews.

DISTRIBUTION: Known only from the central Andes of northern Peru.

PERU.

AMAZONAS: Chachapoyas, *Mathews* (K, Y, type collection?), 3041 (K, in part).

This species is allied to the preceding and possibly is not distinct from it, although in the specimens available the presence or absence of corolla pubescence is never in doubt.

29. *Thibaudia obovata* A. C. Smith, sp. nov.

Frutex; laminis oblongo-obovatis basi attenuatis apice subacutis margine subserratis pinnatinerviis; inflorescentia subfasciculata vel breviter racemosa parce pilosa glabrescente; calyce campanulato 5-lobato; corolla carnea laxa et decidue pilosa; staminibus aequalibus, filamentis connatis superne pilosis, tubulis flexilibus quam loculis paullo longioribus.

Shrub; branchlets subterete, glabrous; petioles subterete, glabrous, 2 to 3 mm. long; leaf blades coriaceous, oblong-obovate, 2.5 to 3.5 cm. long, 1.2 to 1.5 cm. broad, attenuate at base, obtuse or subacute at apex, shallowly serrate at margins (serrations 3 or 4 per centimeter), glabrous, pinnate-veined, the midvein slightly impressed above, prominent beneath, the secondary veins arcuate, 2 or 3 to a side, plane above, slightly raised beneath, the veinlets copiously reticulate, plane; inflorescence axillary, subfasciculate or short-racemose, 3 to 6 flowered; rachis stout (about 1.5 mm. in diameter), 4 to 7 mm. long, pilose with pale spreading hairs about 0.4 mm. long; pedicels subterete, about 1 mm. in diameter, 9 to 12 mm. long, pilose as the rachis, each subtended by a deciduous ovate acute ciliate bractlet about 3 mm. long, bibracteolate near base; calyx tube subcylindric, 2 mm. long and 2.5 mm. in diameter at anthesis, pilose as the pedicel; limb about 2.5 mm. long including lobes, the lobes 1 mm. long and 3 mm. across base, ciliate; corolla red, carnea, pubescent (especially distally) with lax pale hairs about 0.5 mm. long, 12 to 15 mm. long, 3 to 4 mm. in diameter, the lobes triangular, about 2 mm. long; stamens about 11 mm. long; filaments connate in a firm ring, about 2.5 mm. long, glabrous below, densely pubescent at junction with anthers with brown hairs 0.2 mm. long; anther sacs slightly granular, 4 to 4.5 mm. long; tubules wide, flexible, 5.5 to 6 mm. long; stigma truncate.

Type in the Botanisches Museum, Berlin, collected between Tumbilla and San Carlos, Department of Amazonas, Peru, altitude 2,900 to 3,000 meters, June 26, 1915, by A. Weberbauer (no. 7154). Duplicate at F.

DISTRIBUTION: Known only from the type collection.

Somewhat intermediate between the preceding and the following species. In this whole group more material is needed before the relationships and limitations of the species can be definitely settled. The present plant is characterized by its obovate-oblong leaves, pilose calyces and pedicels, and corollas tomentose at the throat.

30. *Thibaudia angustifolia* Hook. Icon. Pl. 2: pl. 110. 1837.

Eurygania angustifolia Klotzsch, Linnaea 24:26. 1851.

Thibaudia weberbaueri Hoer. Bot. Jahrb. Engler 42:313. 1909.

Low shrub; branches and branchlets subrugose, cinereous or brownish, glabrous; petioles rugose, glabrous, 2 to 3 mm. long; leaf blades narrowly oblong, 3.5 to 5.5 cm. long, 1.2 to 2 cm. broad, cuneate or attenuate at base, subacute at apex, serrate at margins (serrations 4 or 5 per centimeter), glabrous, pinnate-veined, the midvein slightly impressed above, raised beneath, the sec-

ondary veins about 3 to a side, spreading, nearly plane, often obscure; inflorescence axillary near ends of branchlets, subfasciculate or short-racemose (rachis rarely 1 cm. long), 3 to 8 flowered, essentially glabrous in all parts; pedicels rugose, 5 to 10 mm. long, bracteate at base and bibracteolate near base with oblong sparsely fimbriate bractlets about 2 mm. long; calyx tube rugose, subcampanulate, about 2.5 mm. long and 3 mm. in diameter at anthesis; limb about 3 mm. long including lobes, the lobes ovate, apiculate, about 1.5 mm. long and 2.5 mm. broad; corolla subcylindric, subrugose, 13 to 16 mm. long, about 4 mm. in diameter, the lobes about 1.5 mm. long; stamens about 11 mm. long; filaments dark castaneous, 2.5 mm. long, firmly connate in a tube, densely pilose distally with hairs up to 0.7 mm. long, continued into slender connectives; anther sacs smooth, 4.5 mm. long, continuing into wide flexible tubules about as long; stigma truncate.

TYPE LOCALITY: Bagasán, near Chachapoyas, Department of Amazonas, Peru. Type collected by Mathews (no. 1443).

DISTRIBUTION: Central Andes of northern Peru, altitude 2,000 to 2,500 meters. PERU.

AMAZONAS: Bagasán, near Chachapoyas, *Mathews* 1443 (K, type). Molinopampa, east of Chachapoyas, *Weberbauer* 4339 (B, type of *T. weberbaueri*).

31. *Thibaudia urbaniana* Hoer. Bot. Jahrb. Engler 42: 315. 1909.

Shrub about 2 meters high; branches and branchlets terete, subrugose, violaceous; petioles rugose, glabrous, 4 to 6 mm. long; leaf blades ovate, 6 to 7 cm. long, 3 to 4 cm. broad, attenuate at base, acute at apex, crenate-serrate at margins (serrations about 3 per centimeter), glabrous, dull green above, brownish beneath, pinnate-veined, the secondary veins about 3 to a side, arcuate-ascending, with the midvein slightly impressed above, raised beneath, the veinlets reticulate, plane, often obscure; inflorescence axillary, subfasciculate or short-racemose (rachis rarely more than 5 mm. long), 4 to 8 flowered, glabrous in all parts; pedicels rugose, 8 to 15 mm. long, bracteate at base and deciduously bibracteolate near base (bractlets oblong, about 1.5 mm. long), swollen distally; calyx coriaceous, subrugose, the tube campanulate, about 1.5 mm. long and 2.5 mm. in diameter at anthesis, the limb 2 to 2.5 mm. long including lobes, the lobes about 1 mm. long; corolla cylindric, rugose, tomentose within distally, about 16 mm. long and 4 mm. in diameter, the lobes oblong, about 2.5 mm. long; stamens 10 mm. long; filaments nigrescent, 2.5 mm. long, firmly connate in a tube, distally pilose; anther sacs nearly smooth, 5.5 mm. long; tubules flexible, about 3 mm. long; stigma truncate.

TYPE LOCALITY: Between Bagasán and Almirante, east of Chachapoyas, Department of Amazonas, Peru, altitude 2,200 to 2,300 meters. Type collected by Weberbauer (no. 4449).

DISTRIBUTION: Known only from the type collection. PERU.

AMAZONAS: East of Chachapoyas, *Weberbauer* 4449 (B, type).

This species bears a very close superficial resemblance to the following, but has much larger flowers.

32. *Thibaudia harmsiana* Hoer. Bot. Jahrb. Engler 42: 314. 1909.

Low shrub; branches and branchlets terete, brownish, glabrous; petioles rugose, subterete, 2 to 4 mm. long, glabrous; leaf blades ovate or slightly obovate, 6 to 7 cm. long, 3 to 4.5 cm. broad, cuneate at base, acute at apex, crenate-serrate at margins (serrations about 4 per centimeter), glabrous, brownish, pinnate-veined, the secondary veins usually 2 per side, oriented near

base, with the midvein plane above, raised beneath, the veinlets reticulate, slightly raised beneath; inflorescence axillary, short-racemose, 10 to 15 flowered, essentially glabrous; rachis rugose, about 2 cm. long; pedicels striate, 10 to 13 mm. long, deciduously bibracteolate near base (bractlets lanceolate, fimbriate-margined, about 2 mm. long), obscurely articulate with calyx; calyx tube coriaceous, campanulate or subglobose, about 2 mm. long and 2.5 mm. in diameter; limb about 1.5 mm. long, the lobes apiculate, about 2 mm. across; corolla carnose, 7 to 8 mm. long, 2.5 to 3 mm. in diameter, the lobes about 1 mm. long, sparsely pilose within; stamens about 4.5 mm. long; filaments castaneous, 1.5 mm. long, firmly connate in a tube, glabrous; anthers stramineous, about 3.5 mm. long, the tubules wide, about as long as the sacs, opening by wide clefts their entire length, the sacs densely pilose at base; stigma truncate.

TYPE LOCALITY: Monzón, Department of Huánuco, Peru, altitude 2,000 to 2,500 meters. Type collected by Weberbauer (no. 3542).

DISTRIBUTION: Known only from the type collection.

PERU.

HUÁNUCO: Monzón, *Weberbauer* 3542 (B, type).

33. *Thibaudia ovata* (Hook. f.) Hoer. Bot. Jahrb. Engler 42: 275. 1909.

Eurygania ovata Hook. f. Bot. Mag. Curtis 104: pl. 6393. 1878.

Thibaudia graebneriana Hoer. Bot. Jahrb. Engler 42: 313. 1909.

Low shrub about 1 meter high; branchlets subterete, glabrous, or deciduously puberulous, with deciduous cinereous bark; petioles subrugose, 2 to 4 mm. long, glabrous, narrowly winged above; leaf blades coriaceous, ovate, 2 to 5 cm. long, 0.8 to 2 cm. broad, cuneate at base, subacute or obtuse at apex, subentire at margins, glabrous, 5-plexi-nerved, the secondary nerves oriented above base, approaching pinnate-veined, with the midnerve plane or slightly impressed above, raised beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence axillary, short-racemose, essentially glabrous in all parts, 3 to 8 flowered; rachis subrugose, 3 to 10 mm. long; pedicels striate, 8 to 13 mm. long, each subtended by a lanceolate, acute, sparsely fimbriate bractlet about 3 mm. long, minutely bibracteolate near base; calyx tube subcylindric or campanulate, about 2.5 mm. long and 3 mm. in diameter at anthesis; limb 2 to 3 mm. long including lobes, thin-margined, the lobes apiculate, less than 1 mm. long; corolla cylindric, thin-carnose, 8 to 9 mm. long, about 4 mm. in diameter, densely pubescent within at apex with spreading hairs about 0.3 mm. long, the lobes about 1 mm. long; stamens about 6 mm. long; filaments castaneous, firmly connate in a tube 2 to 3.5 mm. long, glabrous or sparsely pilose distally; anthers yellow, the sacs smooth, 2.5 mm. long, sparsely pubescent at base with pale hairs about 0.3 mm. long; tubules flaring, about 2 mm. long; stigma peltate.

TYPE LOCALITY: Peru. Type collected by Lobb.

DISTRIBUTION: Andes of central Peru, altitude 1,800 to 3,100 meters.

PERU: (?) "Columbia," *Lobb* (K, type).

JUNÍN: West of Palca, *Weberbauer* 2436 (B, type of *T. graebneriana*).

Huacapistana, *Killip & Smith* 24244 (N, Y). Carpapata, *Killip & Smith* 24353 (N, Y).

Concerning the type locality of this species, there is again to be mentioned the confusion surrounding the Lobb collection. The specimen at Kew is labeled "W. Lobb, Columbia, No. 1," but the original description places the type from the "Andes of Peru." The type of *T. graebneriana* has no marked points of difference from the other collections, although its leaves are somewhat smaller, a difference which may be owing to the higher locality altitude.

34. *Thibaudia spathulata* A. C. Smith, sp. nov.

Frutex humilis; laminis crasso-coriaceis obovatis basi attenuatis apice obtusis margine subserratis 3 ad 5 pli-nerviis; inflorescentia subfasciculata glabra; calyceis tubo breviter cylindrico, limbo patulo 5-lobato; corolla cylindrica; staminibus aequalibus, filamentis connatis glabris, antheris basi pilosis, tubulis flexilibus quam loculis longioribus.

Low shrub; young branchlets striate, mahogany-brown, glabrous; petioles subterete, stout (about 1.5 mm. in diameter), glabrous, 3 to 5 mm. long; leaf blades thick-coriaceous, obovate, 3.5 to 5 cm. long, 1.5 to 2.2 cm. broad, attenuate at base, obtuse or rounded at apex, shallowly and distantly serrate at margins, glabrous, 3 to 5 pli-nerved, the nerves oriented above base, nearly plane above, slightly raised beneath, the veinlets reticulate, obscure; inflorescence axillary, subfasciculate, several-flowered; rachis very short (3 mm. long or less); pedicels subterete, essentially glabrous, about 0.6 mm. in diameter, swollen above, 6 to 10 mm. long, each subtended by an ovate ciliate bractlet about 2 mm. long, bibracteolate near base; flowers glabrous; calyx tube short-cylindric, about 3.5 mm. long and 2.5 mm. in diameter at anthesis; limb spreading, about 4 mm. long including lobes, the lobes acute, 1.5 mm. long, 4 to 5 mm. across base; corolla scarlet, cylindric (flaring a trifle at apex when mature), 10 to 12 mm. long, about 4 mm. in diameter, the lobes triangular, 2 to 2.5 mm. long; stamens about 8 mm. long; filaments glabrous, nigrescent, connate in a tube, about 2.5 mm. long; anther sacs smooth, pilose at base (with a few pale lax hairs 0.2 to 0.5 mm. long), 2 to 2.5 mm. long; tubules wide, 3.5 to 4 mm. long, opening by gaping introrse clefts their entire length; style stout (0.6 mm. in diameter), the stigma truncate.

Type in the herbarium of the Field Museum of Natural History, no. 562,440, collected at Putis, Choimacota Valley, Department of Ayacucho, Peru, altitude 3,300 meters, February 27 to March 12, 1926, by A. Weberbauer (no. 7530).

DISTRIBUTION: Known only from the type collection.

Well marked by its obovate or subspatulate leaves and thick carnose flowers. The anther sacs are unusually pilose at base.

35. *Thibaudia ovalifolia* A. C. Smith, sp. nov.

Frutex humilis; laminis oblongis vel obovato-oblongis breviter petiolatis basi cuneatis vel attenuatis apice subacutis margine subserratis pinnatinerviis; inflorescentia breviter racemosa glabra; calyce campanulato 5-lobato; corolla tenuiter carnosa cylindrica; staminibus aequalibus, filamentis connatis glabris, tubulis latis quam loculis paullo brevioribus.

Low shrub; branches gnarled, cinereous; branchlets subterete, rugose, brownish, glabrous; petioles rugose, 2 to 3 mm. long, glabrous; leaf blades oblong or obovate-oblong, 5 to 7 cm. long, 2 to 3.5 cm. broad, cuneate or attenuate at base, obtuse or subacute at apex, slightly revolute and crenate-serrate at margins (serrations about 3 per centimeter), glabrous, pinnate-veined, the secondary veins 2 or 3 to a side, oriented near base, ascending, with the midvein slightly impressed above, prominent beneath, the veinlets usually obscure; inflorescence short-racemose, glabrous in all parts, 10 to 20 flowered; rachis rugose, subterete, 1 to 1.5 cm. long; pedicels rugose, 12 to 18 mm. long, deciduously bibracteolate near base (bractlets lanceolate-oblong, acute, about 2.5 mm. long, sometimes glandular-margined), swollen distally; calyx rugose, coriaceous, the tube campanulate, 2 to 2.5 mm. long, 4 mm. in diameter at anthesis, the limb about 3 mm. long, the lobes apiculate, minute, 2.5 to 3 mm. across; corolla thin-carnose, short-cylindric, 10 to 11 mm. long, about 4 mm. in diameter, the lobes deltoid, 1.5 mm. long; stamens 7 mm. long; filaments dark castaneous, 2.5 mm. long, connate in a tube, glabrous, continued into slender connectives; anthers

smooth, erect, about 5.5 mm. long, the tubules wide, slightly shorter than the sacs; stigma truncate.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected on Cuesta de Huanacabra, Department of Amazonas (?), Peru, by A. Mathews (no. 883*).

DISTRIBUTION: Probably limited to the Andes of northern Peru.

PERU: *Macleay* (K).

From the three preceding this species differs in its completely glabrous flowers and rugose calyx. The name "*ovalifolia*" was suggested by the collector but was never published.

36. *Thibaudia biflora* (Poepp. & Endl.) Hoer. Bot. Jahrb. Engler 42: 274. 1909.

Ceratostema biflorum Poepp. & Endl. Nov. Gen. & Sp. 1: 6. pl. 10. 1835.

Eurygania biflora Benth. & Hook. Gen. Pl. 2: 568. 1876.

Slender shrub 2 to 3 meters high; branchlets subterete, brownish, densely puberulous with short spreading hairs about 0.2 mm. long, becoming cinereous and glabrous; petioles subterete, sparsely puberulous or glabrous, 1 to 2 mm. long; leaf blades ovate, 15 to 20 mm. long, 10 to 13 mm. broad, rounded at base and apex, entire at margins, essentially glabrous, obscurely 5-plexi-nerved, the midnerve plane above, slightly raised beneath, the secondary nerves oriented near base, plane or slightly raised on both surfaces, the veinlets obscure; inflorescence axillary, 1 to 3 flowered, fasciculate; pedicels terete, 4 to 6 mm. long, pilose with spreading hairs about 0.3 mm. long, circumscribed at base by several imbricate oblong pilose bractlets about 2 mm. long; calyx tube short-cylindric, pilose as the pedicels, 2.5 mm. long and 3 mm. in diameter at anthesis; limb 3 mm. long including lobes, the lobes apiculate, less than 1 mm. long; corolla subcylindric, 11 to 15 mm. long, about 2.5 mm. in diameter, sparsely pilose, the lobes oblong, 1 to 2 mm. long, densely pilose within; stamens 7 to 8 mm. long; filaments dark castaneous, connate in a tube about 2 mm. long, glabrous; anther sacs smooth, 2 to 3 mm. long; tubules wide, flexible, about 4 mm. long; fruit subspherical, up to 5 mm. in diameter, the calyx-limb decurrent.

TYPE LOCALITY: Cerro de San Cristóbal, near Cuchero, Peru. Type collected by Poeppig (no. 1350).

DISTRIBUTION: Andes of northern and central Peru, altitude 1,100 to 1,700 meters.

PERU: Cerro de San Cristóbal, near Cuchero, *Poeppig* 1350 (B, type).

SAN MARTÍN: Guayrapurina, near Tarapoto, *Spruce* 4430 (K, Y). Cerro de Escalero, *Ule* 6790 (B, Go).

JUNÍN: Pichis Trail, Eneñas, *Killip & Smith* 25686 (N, Y).

A very distinct species, marked by its few-flowered inflorescences and rounded leaves. The plant from Junín was growing in an open sphagnum swamp; the others are said to have been epiphytic.

37. *Thibaudia herrerae* A. C. Smith, sp. nov.

Frutex; laminis lanceolato-ovatis basi attenuatis apice subacutis margine integerrimis 5-plexi-nerviis; inflorescentia breviter racemosa, rhachidibus pedicellis brevis pilosis, floribus glabris; calyce breviter cylindrico, limbo patulo 5-lobato; corolla cylindrico-urceolata; staminibus aequalibus, filamentis connatis glabris, antheris basi setosis, tubulis quam oculis paulo longioribus.

Shrub; branches terete, glabrous; branchlets striate, puberulous (hairs 0.2 to 0.3 mm. long); petioles 2 to 3 mm. long, winged above, rugose, essentially glabrous; leaf blades coriaceous, lanceolate-ovate, 3.5 to 5 cm. long, 1 to 1.2 cm. broad, attenuate at base, obtuse or subacute at apex, entire at margins, glabrous,

5-plied-nerved, the nerves nearly plane above, raised beneath, the veinlets reticulate, obscure; inflorescence axillary near ends of branchlets, short-racemose, 5 to 8 flowered; rachis striate, 5 to 8 cm. long, pilose with pale spreading hairs 0.2 to 0.3 mm. long; pedicels rugose, about 0.6 mm. in diameter, 12 to 16 mm. long, pilose as the rachis, each subtended by an ovate ciliate bractlet 1.5 mm. long, bibracteolate near base; calyx tube subcylindric, 2 mm. long and 1.5 mm. in diameter at anthesis, essentially glabrous; limb spreading, about 1.5 mm. long including lobes, the lobes apiculate, about 0.7 mm. long and 2 mm. across base; corolla red, carnose, essentially glabrous, cylindric-urceolate, about 9 mm. long and 3 mm. in diameter at center, the lobes triangular, about 1 mm. long; stamens about 7 mm. long; filaments glabrous, connate in a tube, about 3.5 mm. long; anther sacs slightly granular, setose at base, about 2.2 mm. long; tubules wide, about 2.6 mm. long; stigma truncate.

Type in the U. S. National Herbarium, no. 1,283,197, collected at Forontoy, Santa Ana Valley, Department of Cuzco, Peru, altitude 2,000 to 2,800 meters, in 1927, by F. L. Herrera (no. 1384).

DISTRIBUTION: Known only from the type collection.

This species is marked by very narrow leaves and a delicate inflorescence.

38. *Thibaudia regularis* A. C. Smith, sp. nov.

Frutex; laminis coriaceis ovatis basi attenuatis apice acutis margine subintegerrimis subtus dense pilosis 5-plied-nerviis; inflorescentia breviter racemosa ubique praeter corollas dense et decidue pilosa; calycis tubo subcylindrico, limbo suberecto tubum subaequante; corolla cylindrica glabra; staminibus aequalibus, filamentis tenuibus connatis, antheris basi parce setosis, tubulis quam oculis paullo brevioribus.

Shrub 1 to 2 meters high; branchlets subterete, puberulous (hairs about 0.2 mm. long); petioles 1 to 2 mm. long, winged to base, pilose; leaf blades coriaceous, ovate, 4 to 5 cm. long, 1.5 to 2.5 cm. broad, attenuate at base, acute at apex, entire or shallowly crenate at margins, essentially glabrous above, densely pilose beneath (hairs pale, spreading, about 0.5 mm. long, 10 to 20 per square mm.), 5-plied-nerved, the nerves oriented near base, plane above, slightly raised beneath, the veinlets reticulate, obscure; inflorescence axillary, short-racemose, 6 to 8 flowered, all parts except corollas densely and regularly pilose with pale hairs about 0.5 mm. long when young, glabrous when mature; rachis striate, about 1 mm. in diameter, about 1 cm. long; pedicels subterete, about 0.6 mm. in diameter, 10 to 18 mm. long, each subtended by an ovate-oblong bractlet about 2 mm. long, bibracteolate near base; calyx tube subcylindric, 3 mm. long and 3 mm. in diameter at anthesis; limb 2.5 to 3 mm. long including lobes, the lobes 1 mm. long, about 2 mm. across base; corolla red, glabrous (or pilose within at apex), 11 to 13 mm. long, 3 to 4 mm. in diameter, the lobes triangular, 1.5 mm. long; stamens about 7.5 mm. long; filaments thin, glabrous, connate in a tube, about 3.5 mm. long; anther sacs smooth, sparsely setose at base, about 3 mm. long; tubules wide, about 2 mm. long; stigma peltate.

Type in the herbarium of the Field Museum of Natural History, no. 580,234, collected at Machupicchu, Valle de San Miguel, Department of Cuzco, Peru, altitude 2,200 to 2,400 meters, July 20, 1928, by F. L. Herrera (no. 2004). Duplicate at Y.

DISTRIBUTION: Known only from the type collection.

The unusually soft and fine pubescence of the leaves and young flowers distinguishes this species from its allies.

EXPLANATION OF PLATE 13.—*Thibaudia regularis*, from photograph of type sheet. About one-half natural size.

39. *Thibaudia boliviensis* (Kuntze) Hoer. Bot. Jahrb. Engler 42: 275. 1909.

Hornemannia boliviensis Kuntze, Rev. Gen. Pl. 3²: 191. 1898.

Shrub; branchlets subterete, brownish or cinereous, sparsely puberulous or glabrous; petioles rugose, glabrous, 3 to 4 mm. long; leaf blades coriaceous, ovate, 4 to 9 cm. long, 2 to 3.5 cm. broad, cuneate or subattenuate at base, obtuse at apex, entire and slightly revolute at margins, glabrous, 5 to 7 pinnately-nerved (or pinnate-veined, the veins oriented near base), the secondary nerves ascending, with the midnerve nearly plane or slightly impressed above, raised beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary, subfasciculate or short-racemose (rachis less than 1 cm. long), glabrous in all parts, 3 to 8 flowered; pedicels striate, 8 to 20 mm. long, each subtended by an oblong acute bractlet 2 mm. long, bibracteolate near base (bractlets sparsely fimbriate), slightly swollen distally; calyx tube short-cylindric, about 1.5 mm. long, 2 to 3 mm. in diameter at anthesis; limb 1 to 2 mm. long including lobes, the lobes apiculate, less than 1 mm. long; corolla subcylindric, 7 to 11 mm. long, 3 to 4 mm. in diameter, slightly contracted above, the lobes obtuse, about 1.5 mm. long; stamens 5.5 to 6 mm. long; filaments castaneous, firmly connate in a tube, 2 to 3 mm. long, glabrous; anther sacs nearly smooth, sparsely pubescent at base with hairs about 0.2 mm. long, 2 to 2.5 mm. long; tubules wide, 1.5 to 2 mm. long; style stout, rugose, the stigma truncate.

TYPE LOCALITY: Santa Rosa, Bolivia, altitude 3,000 meters. Type collected by Kuntze (April 3, 1892).

DISTRIBUTION: Eastern Cordillera of northern Bolivia, altitude 1,400 to 3,000 meters.

BOLIVIA: Santa Rosa, Kuntze, April 3, 1892 (B, Y, type). Calli6n, Pearce, in 1864 (K).

LA PAZ: Near Yungas, Rusby 2034 (Y). Cargadira, R. S. Williams 1581 (N, Y). Tipuani, Buchtien 7433 (B, N, Y).

40. *Thibaudia melliflora* R. & P. Fl. Peruv. Chil. 4: pl. 387. 1802.

Thibaudia mellifera R. & P.; St. Hil. Expos. Fam. Nat. 363. 1805.

Eurygania multiflora Klotzsch, Linnaea 24: 27. 1851.

Thibaudia multiflora R. & P.; Klotzsch, Linnaea 24: 27. 1851, as synonym.

Vaccinium melliflorum F. Muell. Sel. Pl. Indust. Cult. 249. 1876.

Sparsely branched shrub about 1 meter high; young branchlets puberulous (hairs pale, up to 0.3 mm. long); petioles stout (2 mm. in diameter), 2 to 3 mm. long, winged to base, puberulous as the branchlets or glabrescent; leaf blades thick-coriaceous, ovate or slightly obovate, 4 to 7 cm. long, 2 to 3 cm. broad, attenuate at base, obtuse or subacute at apex, entire at margins, glabrous or sparsely puberulous near base above, glabrous or pilose with scattered brown hairs beneath, pinnate-veined, the midvein impressed above, prominent beneath, the secondary veins usually oriented near base, arcuate-ascending, 2 or 3 to a side, impressed or plane above, prominent beneath, the veinlets reticulate, obscure; inflorescence axillary, racemose, 7 to 15 flowered; rachis striate, 1 to 2 cm. long, densely pilose with pale spreading hairs about 0.3 mm. long; pedicels striate, about 0.8 mm. in diameter, 6 to 15 mm. long, pilose as the rachis, each subtended by a deciduous bractlet, deciduously bibracteolate near base, the bractlets oblong, ciliate, about 2.5 mm. long; calyx tube subcylindric, rugose, glabrous, 2.5 mm. long and 3.5 mm. in diameter at anthesis; limb 2 mm. long including lobes, the lobes short, apiculate, about 3 mm. across base; corolla scarlet, paler distally, glabrous, cylindric-urceolate, 9 to 11 mm. long and 3 to 4 mm. in diameter when mature, the lobes about 1 mm. long; stamens about 8 mm. long; filaments glabrous, connate in a tube,

about 3.5 mm. long; anther sacs slightly granular, incurved and sparsely setose at base, 3 to 4 mm. long; tubules wide, about 2.8 mm. long; stigma truncate.

TYPE LOCALITY: Department of Huánuco, Peru. Type collected by Ruiz and Pavon.

DISTRIBUTION: Andes of central Peru, altitude 2,000 to 3,000 meters.

PERU: (?) "Columbia," Lobb (K).

HUÁNUCO: Pillao, Pearce 126 (K). Mito, Macbride & Featherstone 1402 (F).

The only previous adequate description of this plant is from Dunal.²⁶ Local names: "Puechato sumacmisqui," "pucosato." The fruit is reported as edible.

DOUBTFUL SPECIES²⁷

THIBAUDIA AEDISIAEFOLIA H. B. K. Nov. Gen. & Sp. 3:274. 1818.

TYPE LOCALITY: Near Fusagasugá, Department of Cundinamarca, Colombia. Type collected by Humboldt and Bonpland.

I have not seen any specimen answering to the description of this species. Hoerold questions its place in the genus. The type has not been available to me.

THIBAUDIA CAULIALATA R. & P.

See notes at end of *Cavendishia*.

THIBAUDIA CERANDER Dun.; DC. Prodr. 7:565. 1839.

TYPE LOCALITY: Not given.

The description of this plant is so incomplete that its affinities can not be guessed. Dunal places it in this genus with doubt.

THIBAUDIA CRENULATA Remy, Ann. Sci. Nat. III. Bot. 8:234. 1847.

TYPE LOCALITY: Chupí, Yungas, Bolivia. Type collected by D'Orbigny.

I have seen no specimens which match the description. It may be allied to *T. boliviensis* or possibly equal to it.

THIBAUDIA DIPHYLLA Dun.; DC. Prodr. 7:562. 1839.

TYPE LOCALITY: Huasa Huasi and Paleo, Peru. Type collected by Dombey.

Probably this incompletely described species is related to *T. angustifolia* and its allies.

THIBAUDIA JUSSIAEI Dun.; DC. Prodr. 7:565. 1839.

TYPE LOCALITY: Peru. Type collected by Joseph de Jussieu.

Like the preceding, the description is too incomplete to permit placing this species.

THIBAUDIA MARTII Meissn.

See notes at end of *Cavendishia*.

THIBAUDIA OCANENSIS Linden, Cat. no. 6:4. 1851.

Descriptions of this "species" and of the two others mentioned in the same publication are not available to me. Probably they are simply listed and are to be considered *nomina nuda*.

THIBAUDIA SCHLIMIANA Linden, Cat. no. 6:4. 1851.

See under *T. ocanensis*, above.

THIBAUDIA SERRATA Dun.; DC. Prodr. 7:563. 1839.

TYPE LOCALITY: Vicinity of Chachapoyas, Department of Amazonas, Peru. Type not cited.

²⁶ DC. Prodr. 7:561. 1839.

²⁷ I have not listed Asiatic species originally described under *Thibaudia*, which have since been transferred to their proper genera.

Possibly this description refers to one of the Mathews collections, such as *T. moricandi*, but it is too incomplete to be considered.

THIBAUDIA TETRAGONA Linden, Cat. no. 6:4. 1851.

See under *T. ocanensis*, above.

EXCLUDED SPECIES

THIBAUDIA DOMINGENSIS Urban, Symb. Antill. 7:319. 1912.

Like the following, this species appears to me to belong to the tribe Vaccinieae. Its correct combination must, however, await further study of the genera there included.

THIBAUDIA KRUGII Urb. & Hoer.; Urban, Symb. Antill. 5:454. 1908.

The several specimens of this species which I have seen, including a sheet of the type collection, incline me to believe it a species of the tribe Euvaccinieae rather than Thibaudieae, although at present its proper generic reference is uncertain.

THIBAUDIA LATIFOLIA Griseb. Fl. Brit. W. Ind. 143. 1864.

This species was transferred to *Vaccinium* by Bentham and Hooker,²⁸ but by Hoerold is again placed in *Thibaudia*. It appears to me to be a true *Vaccinium*.

THIBAUDIA MEXICANA Mart. & Gal. Bull. Acad. Sci. Brux. 9²:530. 1842.

TYPE LOCALITY: Chinantla, State of Oaxaca, Mexico, altitude about 1,200 meters. Type collected by Galeotti (no. 1813).

From the description of this species, of which I have not seen the type, I conclude that it belongs to *Cavendishia*. It may be related to *Cavendishia laurifolia* or *Cavendishia crassifolia*, or identical with one or the other.

THIBAUDIA SUBCRENULATA (Klotzsch) Hoer. Bot. Jahrb. Engler 42:275. 1909.

Vaccinium subcrenulatum Klotzsch; Schomb. Versuch Fauna & Fl. Br. Guian. 1088. 1848, nomen.

Eurygania subcrenulata Niedenzu, Bot. Jahrb. Engler 11:207. 1890.

There has been no formal description of this species. The type is without flowers and I suspect it belongs to the tribe Euvaccinieae rather than Thibaudieae.

15. THEMISTOCLESIA Klotzsch, Linnaea 24:41. 1851

Calyx tube continuous with pedicel, obconical or short-cylindric, narrowly 5-winged to sinuses; limb erecto-patent, 5-lobed, the lobes triangular, subacute; corolla subcylindric, 5-lobed, the lobes triangular, subacute; stamens 10, alternately unequal or subequal, more than half as long as corolla; filaments submembranous, slender, distinct, alternately unequal or subequal, attached to the anther dorsally near its base; anthers membranous, the sacs smooth, the tubules slightly longer than the sacs (rarely more than twice as long), opening by short introrse clefts; style filiform, about as long as corolla.

Slender shrubs, usually epiphytic, with subcoriaceous, alternate, predominantly subcordate-based, obscurely nerved, petioled leaves; inflorescence axillary, short-racemose; flowers pedicelled, several to an inflorescence; pedicels subtended by small bracts, deciduously bibracteolate.

DISTRIBUTION: Andes of Venezuela to Peru. Six species are known.

This genus is distinguished from *Thibaudia* by its slender habit, small leaves, and often slightly dimorphic stamens. *T. pendula* Klotzsch is the type species.

²⁸ Gen. Pl. 2:575. 1876.

KEY TO THE SPECIES

Corolla essentially glabrous (often tufted-setose at apex).

Rachis about 2 cm. long, circumscribed at base by bracts 2 to 4 mm. in length; filaments conspicuously of two lengths (difference about 1 mm.); anthers not more than 4.5 mm. long----- 1. *T. vegasana*.

Rachis seldom over 1 cm. long, circumscribed at base by bracts less than 2 mm. long; filaments of one length or inconspicuously of two lengths (difference not more than 0.5 mm.); anthers at least 5.5 mm. long.

Leaf base subcordate or rounded; lower surface of leaves glabrous or soft-pilose; pedicels about 10 mm. long or more.

Calyx broader than long; pedicels and rachis pilose (Venezuela).

2. *T. pendula*.

Calyx longer than broad; pedicels and rachis glabrous or essentially so (western Colombia and northern Ecuador)----- 3. *T. dependens*.

Leaf base cuneate; lower surface of leaves hispid with stiff hairs; pedicels 5 to 8 mm. long (Peru)----- 4. *T. peruviana*.

Corolla hispid-pilose, the hairs about 1 mm. long.

Anthers 6.5 mm. long; filaments glabrous----- 5. *T. hirsuta*.

Anthers 4 mm. long; filaments pubescent, the hairs up to 1 mm. long.

6. *T. compacta*.

1. *Themistoclesia vegasana* A. C. Smith, sp. nov.

Frutex pulcherrimus; ramis elongatis subscandentibus decidue pilosis; laminis ovatis vel ovato-oblongis basi late cuneatis vel truncatis apice longe acuminatis decidue pilosis obscure 5-nerviis; inflorescentia racemosa multiflora ubique praeter corollas breve pilosa; calyce obprismatico anguste 5-alato; corolla subcylindrica apice breviter setosa; filamentis distinctis alternatim inaequalibus, antheris subaequalibus, tubulis quam loculis duplo longioribus.

Shrub or low tree with elongate subscandent branches; branchlets striate, densely pilose with stiffly spreading hairs up to 0.8 mm. long, becoming glabrous; petioles slender, 1 to 2 mm. long, pubescent as the branchlets; leaf blades thin-coriaceous, ovate or oblong-ovate, 2 to 4 cm. long, 1 to 1.5 cm. broad, broadly cuneate or truncate at base, long-acuminate at apex, entire and slightly revolute at margins, sparsely pilose above with brownish hairs about 0.3 mm. long, pilose beneath on midnerve, becoming glabrous on both surfaces, obscurely 5-plinerved, the midnerve impressed above, prominent beneath, the secondary nerves oriented near base, nearly plane on both surfaces; inflorescence axillary, racemose, 10 to 20 flowered; rachis slender, striate, 2 to 3 cm. long, densely pilose with spreading pale-brown hairs up to 0.7 mm. long, circumscribed at base by numerous imbricate oblong acute bracts up to 4 mm. long; pedicels slender, pubescent as the rachis, 7 to 10 mm. long, each subtended by an oblong deciduous bract, deciduously bracteolate near base (bractlets fimbriate, lanceolate, about 2 mm. long); calyx pilose as the pedicels, obprismatic, winged to the sinuses, the tube 2.5 to 3 mm. long and about 2 mm. in diameter at summit at anthesis, the limb about 1.5 mm. long including lobes, the lobes apiculate, less than 1 mm. long, the sinuses rounded; corolla thin, subcylindric, 7 to 9 mm. long, glabrous proximally, short-setose at apex, about 3 mm. in diameter, the lobes obtuse, about 1 mm. long; stamens alternately unequal, about 7 mm. and 8 mm. long, respectively; filaments free or slightly coherent at base, slender, glabrous, about 2.5 mm. and 3.5 mm. long, respectively; anther sacs 1 to 1.5 mm. long; tubules wide, about 3 mm. long, opening by oval clefts about one-third their length; stigma truncate.

Type in the U. S. National Herbarium, no. 1,351,618, collected in mountains east of Las Vegas, Department of Santander, Colombia, altitude 3,200 to 3,300 meters, December 21, 1926, by E. P. Killip and A. C. Smith (no. 15794). Duplicate at Y.

DISTRIBUTION: Known only from the type locality in the Eastern Cordillera of Colombia, altitude 2,600 to 3,300 meters.

COLOMBIA.

SANTANDER: Las Vegas, *Killip & Smith* 15880 (N, Y).

A beautiful species with extraordinarily dense clusters of delicate flowers, distinguished from its allies by its comparatively elongate rachis, its larger bracts, its conspicuously dimorphic filaments, and its small anthers.

EXPLANATION OF PLATE 14.—*Themistoclesia vegasana*, from photograph of type sheet. About one-half natural size.

2. *Themistoclesia pendula* Klotzsch, *Linnaea* 24:42. 1851.

Episcopia pendula Moritz; Klotzsch, *Linnaea* 24:42. 1851, as synonym.

Themistoclesia humboldtiana Niedenzu, *Bot. Jahrb. Engler* 11:211. 1889.

Macleania humboldtiana Klotzsch; Niedenzu, *Bot. Jahrb. Engler* 11:211. 1889, as synonym.

Shrub with pendulous branches, usually epiphytic; branchlets subcylindric, rather densely hispid with spreading brown hairs up to 1.3 mm. long, becoming glabrous and cinereous; petioles slender, pubescent as the branchlets, 1 to 2 mm. long; leaf blades coriaceous, ovate or oblong-ovate, 3 to 6 cm. long, 1.2 to 2.5 cm. broad, truncate or subcordate at base, caudate-acuminate at apex, entire and slightly revolute at margins, sparsely pilose on both surfaces when young, retaining pubescence on nerves but otherwise becoming glabrous, obscurely 5-plei-nerved, the midnerve strongly impressed above, prominent beneath, the secondary nerves oriented near base, nearly plane on both surfaces, the veinlets reticulate, obscure; inflorescence axillary, short-racemose, 3 to 10 flowered; rachis slender, subterete, densely pubescent with pale brown spreading hairs up to 1 mm. long, 1 to 2 mm. long, circumscribed at base by a few imbricate oblong fimbriate bracts 1 to 2 mm. long; pedicels slender, pubescent as the rachis, 8 to 12 mm. long, each subtended by an oblong fimbriate bractlet about 2 mm. long, deciduously bibracteolate at middle; calyx pubescent as the pedicels, becoming subglabrous, obprismatic, the tube about 2 mm. long and 2.5 mm. in diameter at anthesis, the limb membranous, spreading, 2 to 2.5 mm. long including lobes, the lobes apiculate, less than 1 mm. long, the sinuses rounded; corolla subcylindric, 9 to 10 mm. long, glabrous proximally, short-setose at apex, about 3.5 mm. in diameter, slightly contracted above, the lobes acute, about 1 mm. long; stamens subequal or slightly alternately unequal, 7 to 7.5 mm. long; filaments castaneous, about 2 mm. long, glabrous; anther sacs about 2 mm. long; tubules flexible, about 4 mm. long, opening by oval clefts about 1 mm. long; stigma truncate; young fruit subcylindric, 4 to 5 mm. in diameter, surmounted by the wide-spreading calyx limb.

TYPE LOCALITY: Colonia Tovar, State of Aragua, Venezuela. Type collected by Moritz (no. 1662).

DISTRIBUTION: Andes of northeastern Venezuela, altitude 1,800 to 2,500 meters.

VENEZUELA: *Karsten* (B, type of *T. humboldtiana*); *Moritz* 1340 (B).

SUCRE: Cerro de Turumiquire, *Tate* 214 (N), 215 (N).

FEDERAL DISTRICT: Apretadero, near Caracas, *Jahn* 204 (N).

ARAGUA: Colonia Tovar, *Moritz* 1662 (B, type, N); *Fendler* 733 (G, Y);

Pittier 9994 (N, Y); *Allart* 304 (N, Y).

MÉRIDA: Tabay, *Gehriger* 612 (N).

The two specimens from the Cerro de Turumiquire differ slightly from typical material by their somewhat narrower leaves with subcuneate bases.

T. humboldtiana is based on a sheet marked "*Macleania humboldtiana* Kl. & Karst.," a name published only in synonymy by Niedenzu. No data concerning the specimen are available, but presumably it was collected by Karsten in Venezuela. There are no differences between it and the type of *T. pendula*.

3. *Themistoclesia dependens* (Benth.) A. C. Smith.

Thibaudia dependens Benth. Pl. Hartw. 220. 1846.

Themistoclesia lehmannii Hoer. Bot. Jahrb. Engler 42:332. 1909.

Shrub; branchlets striate, hispid with spreading pale-brown hairs about 1.5 mm. long; petioles 1 to 1.5 mm. long, hispid as the branchlets (hairs about 0.7 mm. long); leaf blades coriaceous, ovate, 3 to 4 cm. long, about 1.5 cm. broad, subcordate or rounded at base, long-acuminate at apex, entire at margins, essentially glabrous (sparsely hispid near base on midnerve and near margins above), obscurely 5-plied-nerved, the midnerve impressed above, prominent beneath, the secondary nerves obscure, oriented near base; inflorescence short-racemose, 5 to 8 flowered; rachis slender, striate, glabrous, up to 1 cm. in length, circumscribed at base by numerous imbricate ovate acute ciliate-margined bractlets up to 2 mm. long; pedicels slender (about 0.3 mm. in diameter), 10 to 20 mm. long, rugose, glabrous, each subtended by a deciduous lanceolate-oblong ciliate bractlet about 2 mm. long; calyx tube obconical, glabrous, rugose, about 4 mm. long and 4 mm. in diameter at summit; limb 2 mm. long including lobes, the lobes apiculate, less than 1 mm. long, 2.5 mm. across base; corolla glabrous (sometimes sparsely pilose at apex when young), cylindric, 10 to 11 mm. long, about 4 mm. in diameter near base, gradually narrowed to 2.5 mm. in diameter above, the lobes 1 to 1.5 mm. long, 1 mm. across base; stamens subdimorphic (filaments alternately slightly unequal), about 9 mm. long, the filaments about 1.5 mm. and 2 mm. long, respectively, pale, glabrous, slender; anther sacs smooth, about 2.5 mm. long; tubules flexible, 5.5 to 6 mm. long, opening by introrse elongate pores about 2 mm. long.

TYPE LOCALITY: Near Pitayo, Department of El Cauca, Colombia. Type collected by Hartweg (no. 1209).

DISTRIBUTION: Central Cordillera of Colombia to northern Ecuador, altitude 2,500 to 3,500 meters.

COLOMBIA.

TOLIMA: *Goudot* (K).

ANTIOQUIA: Alto San José, *Kalbreyer* 1597 (B).

EL CAUCA: Páramo de Guanacas, *Lehmann* 5620 (B, type of *T. lehmannii*).

Páramo de Buena Vista, *Pittier* 1180 (N); Pitayo, *Hartweg* 1209 (K, type).

ECUADOR.

PICHINCHA: Mount Corazón, *Sodiño* 92/35 (B).

4. *Themistoclesia peruviana* A. C. Smith, sp. nov.

Frutex humilis; ramulis petiolisque pilosis; laminis ovatis basi cuneatis apice longe acuminatis subtus hispidis 3 ad 5-plied-nerviis; inflorescentia breve racemosa ubique praeter corollas pilosa; calycis tubo obconico anguste 5-alato; corolla glabra apice pilosa; staminibus subaequalibus, filamentis distinctis glabris, tubulis quam loculis paullo longioribus.

Low shrub; branchlets subterete, pilose with spreading brown hairs about 1 mm. long, swollen at base of petioles; petioles about 2 mm. long, subrugose, pilose as the branchlets; leaf blades coriaceous, ovate, 2 to 3.5 cm. long, 1 to 1.5 cm. broad, cuneate at base, long-acuminate at apex, entire at margins, es-

sentially glabrous above, hispid beneath (hairs 3 or 4 per square mm., stiff, about 1 mm. long), 3 to 5 pli-nerved, the nerves oriented slightly above base, the midnerve impressed above, prominent beneath, the secondary nerves impressed above, obscure beneath, the veinlets reticulate, obscure; inflorescence axillary, short-racemose, 3 to 6 flowered; rachis slender, striate, up to 1 cm. long, pilose with spreading delicate pale-brown hairs about 0.3 mm. long, circumscribed at base by numerous imbricate ovate bractlets about 1 mm. long; pedicels slender (about 0.3 mm. in diameter), 5 to 8 mm. long, striate, pubescent as the rachis, each subtended by an oblong ciliate bractlet about 1.3 mm. long; calyx tube obconical, narrowly 5-winged to sinuses, sparsely pilose (hairs like those of pedicel), about 4 mm. long and 3 mm. in diameter at summit; limb sparsely pilose, about 1.5 mm. long including lobes, the lobes apiculate, about 0.5 mm. long and 2 mm. across base; corolla essentially glabrous near base, sparsely pilose towards apex with stiff brown hairs up to 1 mm. long, cylindric, 9 to 10 mm. long, about 4 mm. in diameter near base, reduced above, the lobes acute, about 2 mm. long and 1 mm. across base; stamens subequal, 7.5 mm. long, the filaments with a tendency to be alternately slightly unequal; filaments glabrous, pale, about 2 mm. long; anther sacs about 3 mm. long; tubules flexible, about 3.7 mm. long, opening by introrse distal clefts about half their length.

Type in the herbarium of the Field Museum of Natural History, no. 536,005, collected in sphagnum at Villcabamba, on Río Chinchao, Department of Huánuco, Peru, altitude about 1,850 meters, July 17 to 26, 1923, by J. F. Macbride (no. 4964).

DISTRIBUTION: Known only from the type collection.

Distinctly marked from the northern species of the genus by its leaf shape, hispid pubescence, and short pedicels.

5. *Themistoclesia hirsuta* A. C. Smith, sp. nov.

Arbor parva; ramulis petiolisque setoso-pilosis; laminis ovatis basi rotundatis vel late cuneatis apice longe acuminatis utrinque pilosis glabrescentibus obscure 3 ad 5 pli-nerviis; inflorescentia breviter racemosa ubique pilosa; calyce obprismatico anguste 5-alato 5-lobato; corolla subcylindrica; filamentis alternatim inaequalibus distinctis glabris, tubulis flexilibus quam oculis duplo longioribus.

Tree 3 to 7 meters high with elongate branches; branchlets subterete, densely clothed with spreading setiform brown hairs about 2 mm. long, becoming cinereous and subglabrous; petioles slender, 2 to 4 mm. long, pilose as the branchlets; leaf blades coriaceous, ovate, about 4 cm. long and 1.5 cm. broad, rounded or broadly cuneate at base, long-acuminate at apex, entire and slightly revolute at margins, pilose on both surfaces (more densely so beneath), with spreading brownish hairs up to 2 mm. long, becoming subglabrous with age, obscurely 3 to 5 pli-nerved, the midnerve impressed above, prominent beneath, the secondary nerves oriented near base, obscure; inflorescence axillary near ends of branchlets, short-racemose, 5 to 10 flowered; rachis, pedicels, and calyx pilose as the branchlets with hairs about 1 mm. long; rachis slender, 1 to 2 mm. long, circumscribed at base by numerous imbricate oblong fimbriate bracts about 4 mm. long; pedicels slender, striate, 7 to 10 mm. long, deciduously bibracteolate near base; calyx obprismatic, narrowly winged to sinuses, the tube about 2.5 mm. long and 3 mm. in diameter at anthesis, the limb 1 to 1.5 mm. long including lobes, the lobes apiculate, about 0.5 mm. long, the sinuses rounded; corolla subcylindric, sparsely hirsute with brownish hairs up to 1 mm. long, 9 to 11 mm. long, about 3 mm. in diameter, the lobes obtuse, about 1 mm. long; stamens alternately unequal, about 10 mm. and 11 mm. long, respectively (anthers approximately similar, filaments of 2 lengths); filaments castaneous,

glabrous, about 4 mm. and 5 mm. long, respectively; anther sacs smooth, 2 mm. long; tubules flexible, 4 to 5 mm. long, opening by oval clefts about 1 mm. long; stigma truncate; disk cup-shaped, densely setose at base of style; young fruit obprismatic, up to 5 mm. in diameter, surmounted by the broad persistent calyx limb.

Type in the U. S. National Herbarium, no. 1,355,102, collected between Pamplona and Toledo, crossing the divide between Río La Teja (Maracaibo drainage) and Río Mesme (Orinoco drainage), Department of Norte de Santander, Colombia, altitude 3,000 meters, February 28, 1927, by E. P. Killip and A. C. Smith (no. 19936). Duplicate at Y.

DISTRIBUTION: Known only from the type collection.

This species and the following are sharply marked from others of the genus by their uniformly pilose corollas. They are distinguished from each other by staminal characters mentioned in the key and by a considerable difference in habit.

6. *Themistoclesia compacta* A. C. Smith, sp. nov.

Frutex compactus humilis; ramulis petiolisque pilosis glabrescentibus; laminis ovatis basi truncatis vel leviter subcordatis apice acuminatis utrinque setosis glabrescentibus obscure 5-pli-nerviis; inflorescentia racemosa ubique dense constanterque hispido-pilosa; calyce obprismatico anguste 5-alato; corolla subcylindrica; filamentis alternatim inaequalibus distinctis pilosis, tubulis quam loculis duplo longioribus.

Low shrub, epiphytic (?); branchlets terete, brownish, laxly pilose with pale hairs up to 0.8 mm. long, becoming glabrous and cinereous; petioles slender, 2 to 3 mm. long, pubescent as the branchlets, the hairs spreading; leaf blades coriaceous, ovate, 20 to 30 mm. long, 13 to 18 mm. broad, truncate or slightly subcordate at base, acuminate at apex, entire and slightly revolute at margins, setose on both surfaces, especially beneath, with pale brown spreading hairs up to 0.8 mm. long, becoming essentially glabrous with age, obscurely 5-plinerved, the midnerve deeply impressed above, prominent beneath, the secondary nerves oriented at base, slightly impressed above, obscure beneath; inflorescence axillary, racemose, 5 to 10 flowered, all parts (rachis, pedicels, calyces, and corollas) densely and persistently hispid-pilose with pale brown hairs about 0.8 mm. long; rachis slender, 1 to 2.5 cm. long, circumscribed at base by several oblong fimbriate bracts 2 to 3 mm. long; pedicels striate, 5 to 7 mm. long, each subtended by a small bractlet and deciduously bibracteolate at middle; calyx tube obprismatic, narrowly winged to sinuses, about 3 mm. long and 2.5 mm. in diameter at anthesis; limb suberect, about 1.2 mm. long including lobes, the lobes acute, less than 1 mm. long, the sinuses obtuse; corolla subcylindric, about 9 mm. long and 3 mm. in diameter, the lobes about 1 mm. long, reflexed at maturity; stamens alternately unequal, 6 mm. and 7 mm. long, respectively (anthers equal, filaments dimorphic); filaments 3 mm. and 4 mm. long, respectively, pilose on all surfaces, especially distally, with pale spreading hairs up to 1 mm. long; anther sacs about 1.5 mm. long; tubules wide, flexible, 2.5 to 3 mm. long, opening by introrse pores less than 1 mm. long; stigma truncate; disk densely setose at base of style.

Type in the herbarium of the New York Botanical Garden, collected in light forest at El Peñón, southwest of Sibaté, Department of Cundinamarca, Colombia, altitude 2,900 to 3,000 meters, October 29, 1917, by F. W. Pennell (no. 2659).

DISTRIBUTION: Cundinamarca, in the Eastern Cordillera of Colombia.
COLOMBIA.

CUNDINAMARCA: Páramo near Bogotá, *Goudot* (K).

From the preceding species, *T. compacta* is distinguished by its shorter anthers, pubescent filaments, and compact habit.

16. **RUSBYA** Britton, Bull. Torrey Club 20:68. 1893

Calyx tube continuous with pedicel, obconical, narrowly winged; limb sub-erect, 5-lobed, the lobes elongate-triangular, acute; corolla cylindric, 5-lobed, the lobes oblong, subacute; stamens 10, slightly shorter than corolla; filaments of two lengths, distinct, attached to the anther dorsally near its base; anthers of two lengths, the sacs faintly granular, the tubules slightly longer than the sacs, with introrse clefts more than half their length; style filiform, nearly as long as corolla.

An epiphytic shrub with densely leafy branches, the young branchlets deeply ridged; leaves coriaceous, alternate, crowded (sometimes appearing whorled), short-petioled, linear-oblong, 1-nerved; stipules persistent, aristate from a swollen base; flowers solitary, axillary; pedicels slender, minutely bracteolate near base.

DISTRIBUTION: One species from northern Bolivia.

This genus has flowers resembling those of *Themistoclesia*, lanceolate one-nerved leaves, and stipules such as those of certain species of *Ceratostema*.

1. **Rusbya taxifolia** Britton, Bull. Torrey Club 20:68. 1893.

Anthopterus taxifolius Drude; Engl. & Prantl, Pflanzenfam. Nachtr. 4¹:270. 1897.

Epiphytic shrub; branchlets brown, subterete when old, when young deeply furrowed, the bark swollen at base of each petiole; stipules persistent, aristate from a swollen base, 2 mm. long, in pairs at the superior base of each petiole; petioles glabrous, less than 1 mm. long, canaliculate above; leaf blades coriaceous and smooth in texture, linear-oblong, 20 to 30 mm. long, 2 mm. broad (rarely laterally fused in pairs, doubling the width), glabrous, cuneate at base, rounded or slightly emarginate at apex, entire and slightly thickened at margins, the midvein depressed above, plane beneath, continuing to apex; flowers sparse, solitary in leaf axils; pedicels circumscribed at base by a few minute ovate ciliate-margined bractlets about 0.6 mm. long, slender (0.2 mm. in diameter), 10 to 12 mm. long, deciduously bracteolate near base (bractlets oblong-ovate, acute, ciliate-margined, about 0.8 mm. long); calyx tube about 3 mm. long and 1 mm. in diameter at summit at anthesis, rugose; limb about 2 mm. long including lobes, the lobes 1.5 mm. long, about 1.3 mm. across base, each with a prominent midnerve, the sinuses acute; corolla glabrous, 8 to 9 mm. long, 4 mm. in diameter near base, contracted to 2 mm. in diameter at throat, the lobes reflexed, about 1.5 mm. long and 1 mm. across base; stamens alternately unequal (about 7 mm. and 7.2 mm. long, respectively); filaments nigrescent, free, 1.5 mm. and 2.5 mm. long, respectively, about 0.4 mm. wide, pubescent at margins with ascending stiff brown hairs about 0.2 mm. long; anther sacs 3 mm. and 2.7 mm. long, respectively; tubules about 3.4 mm. long; style about 7.5 mm. long.

TYPE LOCALITY: Yungas, Department of La Paz, Bolivia, altitude about 1,250 meters. Type collected by Rusby (no. 2692).

DISTRIBUTION: Known only from the type locality.

BOLIVIA.

LA PAZ: Yungas, *Rusby* 2692 (N, Y, type); *Bang* 624 (N, Y).

An isolated species, marked as noted in the generic discussion. Two other species have been referred to this genus on the basis of their stipules, here considered a secondary character.

EXCLUDED SPECIES

RUSBYA PEARCEI Britton, Bull. Torrey Club 20: 68. 1893.

Anthopterus pearcei Drude; Engl. & Prantl, Pflanzenfam. Nachtr. 4¹: 270. 1897.

This species, of which I have seen only a fragment of the type, is probably best placed in some genus of Euvaccinieae, whether *Vaccinium* or an ally can not definitely be said.

RUSBYA BOLIVIANA Britton, Mem. Torrey Club 4: 215. 1895.

Although this species was described without flowers, a single flower is present on a sheet of the type collection borrowed from the Gray Herbarium. This establishes the species unmistakably as near *Vaccinium*, but whether it is a distinct species or one previously described can not be decided at present.

17. CAVENDISHIA Lindl. Bot. Reg. 21: sub pl. 1791. 1836

(? *Chupalon* Adans. Fam. Pl. 2: 164. 1763)

(*Socratesia* Klotzsch, Linnaea 24: 22. 1851)

(*Polyboea* Klotzsch, Linnaea 24: 24. 1851)

(*Proclesia* Klotzsch, Linnaea 24: 32. 1851)

Calyx tube articulate with pedicel, short-cylindric or campanulate; limb erect or spreading, 5-lobed (rarely 3 or 4 lobed), the lobes triangular or ovate; corolla subcylindric, 5-lobed, the lobes triangular or oblong; stamens 10, alternately unequal, nearly as long as corolla; filaments distinct or coherent at base, alternately unequal, attached to the anther dorsally near its base; anthers firm or membranous, the sacs smooth or slightly granular, alternately unequal, the tubules somewhat longer than the sacs (usually not more than twice as long), opening by elongate introrse clefts; style filiform, about as long as corolla, frequently exserted.

Shrubs of various habit, often epiphytic, with coriaceous or subcoriaceous, alternate, pinnately-nerved or pinnate-veined, petioled leaves; inflorescence axillary or terminal, subfasciculate or racemose, bracteate at base and usually enveloped when young by large submembranous reddish bracts; flowers pedicelled, few to many to an inflorescence; pedicels deciduously bibracteolate.

DISTRIBUTION: Mountainous tropical continental America from southern Mexico to northern Bolivia and eastward to British Guiana. Seventy-three species are here described, and in addition there are four names which I am unable to place.

This large genus is superficially distinguished by its large floral bracts; it is also characterized by dimorphic stamens, of which the filaments and anthers are both alternately unequal. With the exception of *C. complectens* and *C. quereme*, no species are found in both Central and South America. To facilitate the use of keys and text, the Central American and South American species are treated in separate groups, the two species above mentioned being keyed under each. *C. nobilis* Lindl. is the type species.

KEY TO CENTRAL AMERICAN SPECIES

(Including Mexico and Panama west of the Canal Zone)

Leaf base strongly cordate, amplexicaul; calyx lobes slightly imbricate.

1. *C. complectens*.

Leaf base slightly cordate or variously shaped, never amplexicaul; calyx lobes not imbricate.

Leaves small (less than 3.5 cm. long and 1.5 cm. broad), rounded at apex.

Flowers solitary or in pairs, ebracteate; pedicels about 6 mm. long; corolla more than 18 mm. long; stamens at least 17 mm. long.

2. *C. pterocarpa*.

Flowers in clusters of 3 to 6, surrounded by large bracts; pedicels not exceeding 3 mm. in length; corolla 12 mm. long or less; stamens not exceeding 11 mm. in length.

3. *C. capitulata*.

Leaves larger (rarely less than 5 cm. long and 1.8 cm. broad), acuminate or subacute at apex (rounded in no. 4 only).

Calyx limb erect, subcylindric, longer than the tube, this often constricted at its summit.

Corolla pubescent, the hairs at least 0.3 mm. long; calyx lobes not callose-thickened.

Leaves not more than 7 cm. long, rounded or obtuse or subacute at apex; calyx and pedicel pubescent.

4. *C. quercina*.

Leaves more than 8 cm. long, caudate-acuminate at apex; calyx and pedicel glabrous.

Corolla less than 20 mm. long; stamens about 15 mm. long; branchlets and leaves essentially glabrous (Guatemala).

5. *C. callista*.

Corolla 25 to 30 mm. long; stamens more than 20 mm. long; branchlets and petioles pubescent; leaves usually somewhat pubescent (Costa Rica).

Leaves oblong, about 3 times as long as broad (5 to 10 cm. broad), 7-plexi-nerved.

6. *C. longiflora*.

Leaves lanceolate, 4 or 5 times as long as broad (3.5 to 4.5 cm. broad), 5-plexi-nerved.

7. *C. bullata*.

Corolla glabrous; calyx lobes callose-thickened.

Flowers in an elongate raceme, the rachis 6 to 10 cm. long; bracts small, much shorter than pedicels.

8. *C. melastomoides*.

Flowers in a shorter crowded raceme, the rachis usually less than 3 cm. long; bracts longer than pedicels, often surrounding the inflorescence.

Corolla 16 to 20 mm. long; anthers about 12 and 15 mm. long respectively; leaves 5 to 8 cm. long; calyx tube short apophysate, about 2 mm. long.

9. *C. endresii*.

Corolla 30 to 40 mm. long; anthers about 24 and 28 mm. long respectively; leaves 9 to 13 cm. long; calyx tube somewhat elongate, 3 to 4 mm. long, rugose.

10. *C. wercklei*.

Calyx limb erecto-patent, usually shorter than the tube, this not constricted.

Racemes long, the rachis 3 cm. long or more; bracts often shorter than the pedicels, not covering the inflorescence; corolla less than 15 mm. long; leaves rarely more than 12 cm. long.

Flowers small (corolla 9 to 10 mm. long; stamens about 8 mm. long).

Racemes 5 to 10 cm. long (rarely less); pedicels often up to 18 mm. in length; calyx and corolla with scattered stiff brown hairs (sometimes glabrous), the calyx lobes not margined (Guatemala and Mexico).

11. *C. laurifolia*.

Racemes 3 to 5 cm. long (rarely more); pedicels usually less than 12 mm. in length; calyx and corolla glabrous, the calyx lobes slightly callose-thickened at margin (Costa Rica).

12. *C. querema*.

Flowers comparatively large (corolla 13 to 15 mm. long; stamens about 12 mm. long)----- 13. *C. crassifolia*.

Racemes shorter, the rachis less than 3 cm. long; bracts longer than the pedicels, often enveloping the inflorescence; corolla more than 15 mm. long; leaves often large.

Corolla 15 to 16 mm. long (Mexico and Guatemala).

Flowers essentially glabrous (calyx sometimes with scattered stiff brown hairs).

Leaves 5 to 6 cm. broad, usually 5-ply-nerved-- 14. *C. chiapensis*.

Leaves 6 to 8 cm. broad, 7-ply-nerved----- 15. *C. latifolia*.

Flowers uniformly pale-pubescent (including pedicels, calyces, corollas, and sometimes bracts)----- 16. *C. guatemalensis*.

Corolla more than 19 mm. long (rarely 17 mm.) (Nicaragua, Costa Rica, and western Panama).

Leaves oblong or oblong-obovate, averaging 2.2 times as long as broad, abruptly caudate-acuminate----- 17. *C. smithii*.

Leaves oblong-lanceolate, averaging 3 times as long as broad, long-caudate-acuminate.

Calyx puberulous; corolla sometimes puberulous.

18. *C. veraguensis*.

Calyx glabrous (frequently glandular); corolla glabrous.

Leaves not punctate or sparsely so----- 19. *C. costaricensis*.

Leaves regularly punctate on both surfaces_ 20. *C. hoffmannii*.

1. *Cavendishia complectens* Hemsl. Biol. Centr. Amer. Bot. 2:272. 1881.

Chupalon complectens Kuntze, Rev. Gen. Pl. 2:383. 1891.

Pendent epiphytic shrub, the branches about 1 meter long; branchlets terete, brownish or cinereous, glabrous, frequently flexuose; leaves practically sessile and strongly amplexicaul, frequently completely surrounding the branchlet, the petioles rugose, glabrous, stout, not more than 1 mm. long, the blades coriaceous, ovate or subrotund, 10 to 16 cm. long, 5 to 11 cm. broad, strongly cordate at base, obtuse or rounded at apex, entire and slightly revolute at margins, glabrous, pinnate-veined, the midvein impressed above, strongly prominent beneath, the secondary veins 6 to 9 to a side, the basal several pairs spreading or reflexed, the upper pairs spreading, ascending, slightly raised above, prominent beneath, the veinlets copiously reticulate, raised on both surfaces; inflorescence terminal or axillary, racemose, glabrous in all parts, 10 to 30 flowered; rachis terete, 3 to 10 cm. long; pedicels subterete, 4 to 8 mm. long, each subtended by an oblong bract (bracts up to 20 mm. long and 15 mm. broad, cuneate and sessile at base, rounded and apiculate at apex, several-veined, subcoriaceous, completely covering the young flowers), deciduously bibraceteolate near base, slightly swollen distally; calyx cylindric, the tube about 3 mm. long and 4 mm. in diameter at anthesis, the limb erect, 4 to 5 mm. long including lobes, the lobes broadly ovate, thin-margined, about 4 mm. long and 4 mm. across, with overlapping margins, the sinuses acute; corolla cylindric, 8 to 9 mm. long and about 4 mm. in diameter, contracted above, the lobes oblong, acute, 1.5 to 2 mm. long; stamens alternately slightly unequal, about 8 mm. and 8.3 mm. long, respectively; filaments nigrescent, distinct, glabrous, 2 mm. and 2.5 mm. long, respectively; anthers 6.5 mm. and 6.2 mm. long, respectively (short filaments belonging to long anthers), the sacs nearly smooth, about 2.5 mm. long, the tubules wide, 4 mm. and 3.7 mm. long, respectively; stigma truncate.

TYPE LOCALITY: Costa Rica. Type collected by Endres (no. 257).

DISTRIBUTION: Mountains of Costa Rica, altitude 1,200 to 2,000 meters; also Western Cordillera of Colombia and Ecuador.

COSTA RICA.

SAN JOSÉ: La Palma, *Wercklé* 11598 (N); *Pittier* 10170 (N); *Brade* 16672 (N); *Tonduz* 7404 (12439 Herb. Nat. Cost.; F, G, N); *W. W. & H. E. Rowlee* 255 (N); *Standley* 32918 (N), 32950 (N), 33205 (N), 38121 (N), 38134 (N). San José, *Alfaro* 5843 (N). La Hondura, *Standley & Valerio* 51928 (N).

CARTAGO: La Estrella, *Standley* 39162 (N). Orosi, *Standley* 39814 (N).

El Muñeco, south of Navarro, *Standley* 33906 (N); *Standley & Torres* 51738 (N), 51772 (N).

This is an unmistakable species with amplexicaul leaves, evidently quite common locally in Costa Rica. The above flower dimensions are average, but, of course, there are slight variations in one direction or the other. The stamens frequently appear isomorphic, but examination shows a slight alternate variation in the dimensions of their parts.

The South American specimens are mentioned in the following section of this treatment.

2. *Cavendishia pterocarpa* (Donn. Smith) A. C. Smith.

Themistoclesia pterocarpa Donn. Smith, Bot. Gaz. 44: 113. 1907.

Epiphytic shrub about 1 meter high; branchlets subterete, minutely puberulous or glabrous, dark brown, becoming cinereous; leaves crowded, the petioles about 2 mm. long, narrowly winged, the blades coriaceous, obovate, 15 to 22 mm. long, 8 to 12 mm. broad, attenuate at base, rounded or slightly emarginate at apex, entire, slightly revolute and thickened at margins, sparsely puberulous when young, becoming glabrous, obscurely pinnate-veined, the midvein slightly impressed above, prominent beneath, the secondary veins 2 to 4 to a side, oriented near base, ascending, slightly raised on both surfaces, the veinlets reticulate, obscure or slightly raised on both surfaces; inflorescence axillary, fasciculate, 1 to 2 flowered, essentially glabrous in all parts; pedicels subterete, 5 to 8 mm. long, circumscribed at base by several oblong, minutely fimbriate bractlets about 1.5 mm. long, surmounted at apex by several minute deciduous cartilaginous teeth; calyx obprismatic, narrowly winged to sinuses, the tube about 2 mm. long and 2 mm. in diameter at anthesis, the limb suberect, 2 mm. long including lobes, the lobes triangular, less than 1 mm. long, the sinuses rounded; corolla narrowly cylindric, 20 to 22 mm. long, about 4 mm. in diameter near base, gradually contracted above, glabrous without or minutely puberulous when young, sparsely tomentose within distally, the lobes triangular, subacute, about 1 mm. long; stamens alternately slightly unequal, about 17.5 mm. and 18 mm. long, respectively (anthers similar, filaments dimorphic); filaments loosely coherent at base, dark castaneous, glabrous, 2.5 mm. and 3 mm. long, respectively; anther sacs nearly smooth, incurved at base, about 3 mm. long; tubules flexible, 12.5 to 13 mm. long; stigma peltate.

TYPE LOCALITY: Mount Carizia, Costa Rica, altitude 2,000 meters. Type collected by Pittier (no. 14031).

DISTRIBUTION: Mountains of Costa Rica, altitude 2,000 to 2,400 meters.

COSTA RICA: Mount Carizia, *Pittier* 14031 (N, type).

HEREDIA: Yerba Buena, northeast of San Isidro, *Standley & Valerio* 49837 (F, N). Cerros de Zurquí, northeast of San Isidro, *Standley & Valerio* 50822 (N).

In spite of its apparent lack of large bracts, there is no doubt that this species is a true *Cavendishia*, easily distinguished from the following on characters mentioned in the key.

3. *Cavendishia capitulata* Donn. Smith, Bot. Gaz. 25:147. 1898.

Low epiphytic shrub about 1 meter high; branchlets subterete or slightly angled, dark brown, glabrous; leaves numerous, the petioles rugose, 1 to 2 mm. long, the blades coriaceous, ovate-oblong or slightly obovate, 18 to 30 mm. long, 7 to 12 mm. broad, cuneate at base, rounded at apex, entire and slightly revolute at margins, glabrous, obscurely 5-plei-nerved, the midnerve impressed above, prominent beneath, the secondary nerves oriented near base, ascending, with the copious veinlets slightly raised on both surfaces; inflorescence axillary, fasciculate (peduncle less than 3 mm. long), 3 to 7 flowered, glabrous in all parts, surrounded by several membranous imbricate bracts, the bracts obovate, up to 2 cm. long and 1 cm. broad, subattenuate at base, red or purple, rarely sparsely brown-pilose; pedicels subterete, 1 to 3 mm. long, deciduously bibracteolate near base; calyx tube subcylindric, 2 to 3 mm. long and about 2 mm. in diameter at anthesis; limb suberect, 2 to 3 mm. long, including lobes, the lobes triangular, less than 1 mm. long, the sinuses rounded; corolla cylindric, 11 to 14 mm. long, 3 to 4 mm. in diameter, the lobes triangular, about 1 mm. long; stamens subequal (alternate filaments and anthers compensatingly unequal); filaments dark castaneous, glabrous, connate in basal half, 2 mm. and 4 mm. long, respectively; anther sacs slightly granular, about 3 mm. long; tubules flexible, about 7 mm. and 5.5 mm. long, respectively; stigma peltate.

TYPE LOCALITY: La Palma, Province of San José, Costa Rica, altitude 1,500 meters. Type collected by Wercklé (no. 11565).

DISTRIBUTION: Mountains of Costa Rica, altitude 600 to 1,700 meters.

COSTA RICA.

GUANACASTE: El Silencio, *Standley & Valerio* 44734 (N), 44822 (N). Los Ayotes, near Tilarán, *Standley & Valerio* 45381 (F, N), 45434 (F, N), 45623 (N).

ALAJUELA: Fraijanes, *Standley & Torres* 47623 (F, N).

SAN JOSÉ: La Palma, *Wercklé* 11565 (N, type). La Hondura, *Standley* 36360 (N), 36395 (N), 37664 (N), 37862 (N).

CARTAGO: La Estrella, *Standley* 39375 (N), 39418 (N), 39538 (N), 39581 (N). El Muñeco, south of Navarro, *Standley* 33507 (N). Orosi, *Standley* 39852 (N), 39634 (N). South of Cartago, *Stork* 363 (N).

A very distinct species, related to the preceding. The flower dimensions stated are from the type specimen. Slightly larger flowers, especially as regards the dimensions of calyces, are often apparent. Frequently the calyx-limb is margined with a few short hairs. The shape and size of the bracts are also subject to variation. The above citations are an illustration of the extent to which Mr. P. C. Standley has broadened our knowledge of Central American plants by his excellent collections.

4. *Cavendishia quercina* A. C. Smith, sp. nov.

Frutex epiphyticus; ramulis decidue puberulentis; laminis oblongis vel ovato-oblongis basi cordatis vel subcordatis apice obtusis 5 ad 7 pli-nerviis; inflorescentia racemosa multibracteata, bracteis oblongis sessilibus; floribus breviter pilosis; calyce breviter cylindrico apophysato, limbo erecto quam tubo longiore 5-lobato, lobis apiculatis; corolla cylindrica; staminibus subaequalibus (filamentis antherisque compensanter inaequalibus), filamentis distinctis superne pilosis, tubulis quam loculis longioribus.

Epiphytic shrub, usually growing on *Quercus*; branchlets subterete, puberulous when young with gray hairs up to 0.5 mm. long, becoming glabrous; petioles subrugose, faintly puberulous or glabrous, 3 to 5 mm. long; leaf blades thick-coriaceous, oblong or ovate-oblong, 4 to 7 cm. long, 2 to 3.5 cm. broad, cordate or subcordate at base, rounded or obtuse at apex, entire and strongly revolute at margins, essentially glabrous (sparsely puberulous on nerves beneath when young), 5 to 7 pli-nerved, the midnerve deeply impressed above, prominent beneath, obscurely pinnate-veined distally, the secondary veins oriented near base, spreading, slightly impressed above, prominent beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence terminal or axillary, racemose, 8 to 25 flowered; rachis subterete, 2 to 10 cm. long, puberulous with pale spreading hairs about 0.2 mm. long, becoming glabrous; pedicels striate, puberulous, each subtended by bright red membranous bracts (bracts oblong, up to 2 cm. long and 1 cm. broad, sessile and broad at base, subacute at apex), 10 to 15 mm. long at maturity, minutely and deciduously bibracteolate near base, swollen distally; calyx tube short-cylindric, apophysate, 2 to 3 mm. long, about 3 mm. in diameter at anthesis, contracted above, pilose with pale spreading hairs about 0.2 mm. long; limb erect, 4 to 5 mm. long including lobes, the lobes triangular, 1.5 to 2 mm. long, each margined with 4 or 5 small glands, the sinuses rounded; corolla cylindric, 15 to 18 mm. long, about 4 mm. in diameter, pale puberulous with hairs up to 0.3 mm. long, the lobes triangular, obtuse, 1.5 mm. long; stamens subequal (filaments and anthers compensatingly unequal), about 14 mm. long; filaments dark castaneous, distinct, distally pilose with hairs about 0.2 mm. long, 3 mm. and 5.5 mm. long respectively; anther sacs slightly granular, 3 to 4 mm. long; tubules wide, 8.5 mm. and 5.5 mm. long respectively; stigma peltate.

Type in the U. S. National Herbarium, no. 577,938, collected on summit of Cerro de Carizia, Costa Rica, altitude 1,900 meters, September, 1900, by H. Pittier (no. 14030). Duplicate at Y.

DISTRIBUTION: Mountains of Costa Rica, altitude 1,600 to 2,500 meters.

COSTA RICA: Candelaria, *Brade* 2090 (B).

SAN JOSÉ: Between Aserrí and Tarbaca, *Standley* 34145 (N). Finca La Cima, above Los Lotes, north of El Copey, *Standley* 42578 (N), 42677 (N), 42772 (N), 42792 (N). Zurquí, *Standley & Valerio* 48023 (N), 48122 (N). Laguna de la Chonta, northeast of Santa María de Dota, *Standley* 42205 (N).

The present species is without close relatives and is clearly distinguished from its allies by the pubescent pedicels and calyces and by its smaller leaves, which are obtuse at the apex. The racemes often elongate to 10 cm., retaining a brilliant bract at the base of each pedicel. As a rule the corollas are early deciduous.

5. *Cavendishia callista* Donn. Smith, Bot. Gaz. 20: 5. pl. 2. 1895.

Epiphytic shrub; branchlets terete, brownish or cinereous, sparsely setose with hairs about 1 mm. long or glabrous; petioles subrugose, setose or glabrous, 5 to 12 mm. long; leaf blades coriaceous, oblong or ovate-oblong, truncate or subcordate at base, long-acuminate at apex, entire or slightly revolute at margins, glabrous, or sparsely setose on nerves beneath, 5 to 7 pli-nerved, the secondary nerves oriented near base, with the midnerve impressed above, strongly prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces; inflorescence terminal, racemose, 15 to 35 flowered; racemes solitary or in pairs, circumscribed at base by numerous membranous, oblong or ovate, glabrous bracts up to 2 cm. long; rachis angled, stout, 5 to 10 cm. long, glabrous; pedicels striate, glabrous, 6 to 12 mm. long, each subtended by

a bract similar to those at base of rachis, bibracteolate at middle with oblong bractlets about 5 mm. long, swollen distally; calyx tube subrugose, short-cylindric, glabrous, 2 to 2.5 mm. long, about 3 mm. in diameter at anthesis, slightly contracted above; limb erect, glabrous, 6 to 6.5 mm. long including lobes, the lobes oblong, subacute, about 3.5 mm. long, sparsely glandular-margined or entire, the sinuses acute; corolla cylindric, about 18 mm. long, 4 to 5 mm. in diameter, densely pubescent with persistent pale spreading hairs up to 0.4 mm. long, the lobes triangular, subacute, about 1.5 mm. long; stamens subequal (filaments and anthers compensatingly unequal), about 15 mm. long; filaments castaneous, loosely coherent at base, glabrous or sparsely puberulous distally, 3 mm. and 7 mm. long, respectively; anther sacs slightly granular, 3.5 to 4 mm. long; tubules wide, flexible, 10 mm. and 6 mm. long, respectively; stigma truncate.

TYPE LOCALITY: Between Cobán and Samac, Department of Alta Verapaz, Guatemala, altitude about 1,400 meters. Type collected by von Tuerckheim (no. 941).

DISTRIBUTION: Guatemala, known only from the Department of Alta Verapaz, altitude 300 to 1,400 meters.

GUATEMALA.

ALTA VERAPAZ: Between Cobán and Samac, *von Tuerckheim* 941 (F, G, N, type, Y). Cubilquitz, *von Tuerckheim* 4119 (F, N), 7916 (F, G, N, Y). Cobán, *von Tuerckheim* II. 1795 (G, N, Y). Trece Aguas, near Senahú, *Pittier* 340 (N). Finca Sepacuité, *Cook & Griggs* 418 (N), 617 (N). Chamá, *Johnson* 202 (N).

Evidently a common species in the region mentioned. This species and the two following are very handsome shrubs, readily distinguished from one another on the characters stated in the key.

6. *Cavendishia longiflora* Donn. Smith, Bot. Gaz. 37:420. 1904.

Shrub (epiphytic?); branchlets subterete or angled, densely and regularly pubescent with brown or cinereous, spreading hairs about 2 mm. long, becoming glabrous with age; petioles rugose, 4 to 11 mm. long, densely pilose as the branchlets; leaf blades coriaceous, broadly oblong, 10 to 23 cm. long, 4.5 to 9 cm. broad, subcordate or truncate at base, caudate-acuminate at apex (acumen about 2 cm. long on large leaves), entire and narrowly revolute at margins, glabrous above or puberulous on nerves, pilose beneath, especially on nerves, with stiff erect brown hairs about 1 mm. long, 7 to 9 pli-nerved, the secondary nerves oriented near base, with the midnerve impressed above, strongly prominent beneath, the veinlets copiously reticulate, slightly impressed or plane above, raised beneath; inflorescence terminal or axillary, racemose, 15 to 25 flowered, circumscribed at base by numerous papyraceous, imbricate, oblong or ovate, glabrous bracts up to 4 cm. long and 3 cm. broad; rachis sharply angled, glabrous, 6 to 10 cm. long; pedicels subrugose, 6 to 12 mm. long, each subtended by a bract similar to those at base of racemes (bracts frequently obovate, 3 times as long as broad), glabrous, bibracteolate below middle with oblong lanceolate bractlets 4 to 5 mm. long; calyx tube rugose, glabrous, slightly apophysate at base, about 4 mm. long and 3.5 mm. in diameter at anthesis; limb erect, about 4 mm. long including lobes, glabrous, the lobes triangular, subacute, about 2 mm. long; corolla cylindric, 26 to 30 mm. long, about 5 mm. in diameter, densely and persistently pubescent with pale brown ascending hairs up to 1 mm. long, the lobes triangular, obtuse, about 1.5 mm. long; stamens subequal (filaments and anthers compensatingly unequal), about 26 mm. long; filaments dark castaneous, loosely coherent at base, glabrous or faintly puberulous distally, 3 mm. long and 6 to 7 mm. long, respectively; anther

sacs nearly smooth, 8 to 9 mm. long; tubules wide, flexible, 17 mm. and 14 mm. long, respectively; stigma peltate.

TYPE LOCALITY: Alto de La Palma, Province of San José, Costa Rica, altitude 1,700 meters. Type collected by Tonduz (no. 7391).

DISTRIBUTION: Known only from type locality, altitude 1,600 to 1,700 meters. COSTA RICA.

SAN JOSÉ: La Palma, *Tonduz* 7391 (12486 Herb. Nat. Cost.; B, F, G, N, type); *Brade* 51 (B); *Standley* 33089 (N).

7. *Cavendishia bullata* Smith & Standl., sp. nov.

Frutex epiphyticus; ramulis petiolisque pubescentibus glabrescentibus; laminis bullatissimis oblongo-lanceolatis basi abrupte truncatis apice caudato-acuminatis utrinque parce setosis 5 ad 7 pli-nerviis; inflorescentia racemosa multiflora basi bracteis oblongo-ovatis papyraceis imbricatis instructa; calyce glabro, tubo rugoso, limbo erecto quam tubo longiore; corolla cylindrica dense constanterque pubescente; filamentis antherisque alternatim inaequalibus, filamentis distinctis glabris, tubulis quam oculis longioribus.

Epiphytic shrub about 1 meter high; branchlets subterete, brownish, densely pubescent with pale brown setiform hairs about 2 mm. long, becoming glabrous with age; petioles subterete, 8 to 18 mm. long, densely pubescent as the branchlets; leaf blades coriaceous, strongly bullate, oblong-lanceolate, 15 to 28 cm. long, 3.5 to 4.5 cm. broad, abruptly truncate at base, caudate-acuminate at apex, entire and revolute at margins, glabrous above or setose on veins (sometimes sparsely setose on surface), setose on nerves beneath with hairs about 1.3 mm. long (sometimes setose on surface, completely glabrous with age), 5 to 7 pli-nerved, the nerves oriented from base or slightly above, with the midnerve deeply impressed above, very prominent beneath, the veinlets reticulate, slightly raised or plane on both surfaces; inflorescence terminal or axillary, racemose, 30 to 40 flowered at maturity, circumscribed at base by numerous orange papyraceous imbricate oblong-ovate glabrous bracts up to 4 cm. long and 2 cm. broad; rachis stout (4 to 5 mm. in diameter), sharply angled, glabrous, 8 to 11 cm. long at maturity; pedicels arranged on the rachis more or less spirally, striate, 8 to 12 mm. long, each subtended by a deciduous bract similar to those at base of racemes, bibracteolate near base with lanceolate bractlets 4 to 5 mm. long; calyx tube strongly rugose, the basal margin produced below articulation, glabrous, about 3 mm. long and 3 mm. in diameter at anthesis; limb erect, slightly flaring, about 5 mm. long including lobes, glabrous, the lobes triangular, subacute, about 1.5 mm. long, narrowly membranous-margined; corolla cylindric, 26 to 28 mm. long, about 5 mm. in diameter, densely and persistently pubescent with pale subtomtose hairs up to 1 mm. long, the lobes triangular, subacute, about 1 mm. long, deep red at margins (corolla otherwise orange-yellow); stamens subequal (filaments and anthers compensatingly unequal), about 22 mm. long; filaments membranous, pale castaneous, loosely coherent at base, glabrous, 4 mm. and 9 mm. long respectively; anther sacs nearly smooth, 7 to 8 mm. long; tubules wide, flexible, 12 mm. and 8 mm. long respectively, opening by clefts more than half their length; stigma truncate.

Type in the herbarium of the Field Museum of Natural History, no. 598,143, collected at Naranjo, Costa Rica, altitude about 1,700 meters, March 5, 1928, by H. E. Stork (no. 1789).

DISTRIBUTION: Mountains of Costa Rica, altitude 1,400 to 1,700 meters.

COSTA RICA.

CARTAGO: El Muñeco, on Río Navarro, *Standley & Torres* 51279 (N, Y).

A striking species sharply distinguished from the preceding on its leaf shape. In the type specimen the leaves are nearly glabrous. The other collection cited

has a leaf surface more or less densely hispid. In all other respects the two are identical, and this pubescence does not seem a specific character.

8. *Cavendishia melastomoides* (Klotzsch) Hemsl. Biol. Centr. Amer. Bot. 2: 273. 1881.

Socratesia melastomoides Klotzsch, Linnaea 24: 23. 1851.

Cavendishia klotzschiana Niedenzu, Bot. Jahrb. Engler 11: 206. 1890.

Cavendishia graebneriana Hoer. Bot. Jahrb. Engler 42: 324. 1909.

Chupalon melastomoides Kuntze, Rev. Gen. Pl. 2: 383. 1891.

Low epiphytic shrub; branchlets terete, brownish or cinereous, glabrous; petioles subterete, glabrous or sparsely puberulous, 4 to 6 mm. long; leaf blades coriaceous, oblong or ovate-oblong, 4.5 to 8 cm. long and 1 to 3 cm. broad, cuneate at base, long-acuminate at apex, entire and narrowly revolute at margins, glabrous above, glabrous beneath or sparsely pilose with hairs of two types (stout brown appressed hairs about 0.2 mm. long and pale spreading slender hairs up to 0.5 mm. long), obscurely 3 to 5 pli-nerved, the mid-nerve impressed above, prominent beneath, the secondary nerves oriented near base, plane or slightly raised on both surfaces, the veinlets reticulate, slightly raised above, plane beneath; inflorescence terminal or axillary; rachis subterete, glabrous or with minute glandular hairs, 6 to 12 cm. long, not always sharply distinguished from the branchlets; pedicels subrugose, 10 to 20 mm. long, glabrous or with minute glandular hairs, 1 or 2 per centimeter of rachis, each subtended by a deciduous greenish papyraceous oblong bract about 1 cm. long, bibracteolate near base with oblong bractlets 2 to 3 mm. long; calyx glabrous, broadly apophysate at base, the tube about 1.5 mm. long and 6 mm. across apophysis, the limb erect, flaring, 4.5 to 5 mm. long including lobes, the lobes triangular, subacute, about 1 mm. long, the sinuses rounded; corolla cylindric, 28 to 40 mm. long, 4 to 5 mm. in diameter, glabrous, viscid, the lobes triangular, obtuse, 1.5 mm. long, often reflexed at maturity; stamens subequal (filaments and anthers compensatingly unequal), 26 to 35 mm. long; filaments castaneous, slender, slightly coherent at base, pale pubescent distally with hairs up to 0.3 mm. long or subglabrous, 4 to 6 mm. and 10 to 11 mm. long, respectively; anther sacs nearly smooth, 5 to 7 mm. long; tubules flexible, 17 to 24 mm. and 13 to 19 mm. long, respectively; stigma truncate.

TYPE LOCALITY: Costa Rica. Type collected by Warszewicz.

DISTRIBUTION: Mountains of Costa Rica, altitude 1,500 to 2,000 meters.

COSTA RICA: Warszewicz (B, type); Wercklé 29 (B, type of *C. graebneriana*). Estrella road, Stork 2569 (F).

SAN JOSÉ: Las Nubes, Standley 38506 (N), 38741 (N).

CARTAGO: Santa Clara de Cartago, Mazon & Harvey 8197 (N).

The name *C. melastomoides* must be retained for this plant rather than for the Colombian species (*Thibaudia melastomoides* H. B. K.), for which the name *C. miconioides* is proposed in this treatment. The combination *C. melastomoides* was never formally applied to the Colombian plant until 1909 (by Hoerold), whereas it was used in regard to the Costa Rican plant in 1881. There is no need, therefore, for Niedenzu's name *C. klotzschiana*.

The type of *C. graebneriana* has leaves considerably narrower than those of the type of *C. melastomoides*, but the specimens here cited show such intermediate variations in this respect that it can not be considered a specific difference. There is a good deal of variation in the flower dimensions of various specimens. Completely mature flowers seem to average 4 cm. in length. The proportions of flower parts, however, are very constant.

9. *Cavendishia endresii* Hemsl. Biol. Centr. Amer. Bot. 2: 273. 1881.*Chupalon endresii* Kuntze, Rev. Gen. Pl. 2: 383. 1891.*Cavendishia glutinosa* Hoer. Bot. Jahrb. Engler 42: 321. 1909.

Low shrub, usually epiphytic; branchlets subterete or striate, slender, glabrous, brownish or cinereous; petioles subterete, glabrous, 4 to 8 mm. long; leaf blades ovate-oblong or lanceolate-oblong, 5 to 8.5 cm. long, 1.2 to 2.5 cm. broad, cuneate at base, long-acuminate at apex, entire and slightly revolute at margins, glabrous, obscurely pinnate-veined, the midvein impressed or plane above, somewhat prominent beneath, the secondary veins 2 or 3 to a side, oriented near base, ascending, plane or slightly impressed above, slightly raised beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary near ends of branchlets, short-racemose, 3 to 6 flowered, glabrous in all parts; rachis subterete, 0.5 to 2 cm. long; pedicels subterete, 7 to 14 mm. long, each subtended by a deciduous papyraceous oblong bract up to 2 cm. long (the entire inflorescence more or less covered by similar imbricate bracts when young), deciduously bibracteolate near base with triangular bractlets less than 1 mm. long; calyx slightly viscid, apophysate at base, the tube 1.5 mm. long and 3 mm. in diameter at anthesis, the limb erect, about 2 mm. long including lobes, the lobes somewhat thickened, triangular, apiculate, less than 1 mm. long, the sinuses rounded; corolla cylindric, 15 to 17 mm. long, about 3.5 mm. in diameter, the lobes triangular, subacute, about 1 mm. long; stamens subequal (filaments and anthers compensatingly unequal), 14 to 14.5 mm. long; filaments membranaceous, distinct or loosely coherent at base, glabrous, 2.5 mm. and 4.5 mm. long respectively; anther sacs slightly granular, about 2.5 mm. long; tubules flexible, 10.5 mm. and 8.5 mm. long respectively; stigma truncate; young fruit subspherical, up to 5 mm. in diameter, surmounted by the persistent calyx limb.

TYPE LOCALITY: Costa Rica. Type collected by Endres (no. 173).

DISTRIBUTION: Mountains of Costa Rica and western Panama, altitude 1,300 to 2,000 meters.

COSTA RICA: *Endres* 173 (K, type).

SAN JOSÉ: La Palma and vicinity, *Wercklé* 19 (B, type of *C. glutinosa*), 50 (B); *Brade* 2101 (B); *Stork* 429 (N); *Maxon & Harvey* 7912 (N), 8018 (N). La Hondura, *Standley* 36258 (N), 37622 (N).

PANAMA.

CHIRIQUÍ: Cerro de Lino, above El Boquete, *Pittier* 3036 (F, N).

The present species is closely related to *C. wercklei*. The flower dimensions above stated are more or less average for the Costa Rican specimens. The specimens from Panama have slightly larger flowers, the corollas being 2 cm. long and the stamens concomitantly large.

10. *Cavendishia wercklei* Hoer. Bot. Jahrb. Engler 42: 325. 1909.

Shrub with elongate branches; branchlets subterete, glabrous, slender, brownish; petioles subrugose, glabrous, 5 to 8 mm. long; leaf blades coriaceous, oblong or ovate-oblong, 9 to 13 cm. long, 2.5 to 6 cm. broad, truncate or subcuneate at base, caudate-acuminate at apex (acumen about 2 cm. long), entire and slightly revolute at margins, glabrous above, glabrous beneath or sparsely pilose with appressed nigrescent hairs about 0.2 mm. long, 5 to 7 pinnate-nerved, the secondary nerves oriented near base, with the midnerve slightly impressed above, prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces; inflorescence axillary or terminal, racemose, circumscribed at base and completely covered, when young, by numerous imbricate membranous oblong glabrous bracts up to 4 cm. long and 2.5 cm. broad, 5 to 12 flowered, glabrous in all parts; rachis angled, 1 to 2 cm. (up to 7 cm.?) long; pedicels

subterete, about 10 mm. long, each subtended by a deciduous bract similar to those at base of racemes, deciduously bibracteolate near base with ovate bractlets about 1 mm. long, slightly swollen distally; calyx tube strongly rugose, the base produced below the articulation, subcylindric, 4 to 4.5 mm. long and 3 to 4 mm. in diameter at anthesis; limb erect, slightly flaring, about 6 mm. long including lobes, the lobes triangular, about 1.5 mm. long, callose-tipped; corolla cylindric, membranous, 30 to 40 mm. long, 5 to 6 mm. in diameter, the lobes triangular, subacute, about 1 mm. long; stamens subequal (filaments and anthers compensatingly unequal), 28 to 29 mm. long; filaments castaneous proximally, nigrescent distally, distinct, puberulous when young and at margins with hairs up to 0.3 mm. long, 2 mm. and 7.5 mm. long, respectively; anther sacs slightly granular, 8 to 10 mm. long; tubules wide, flexible, 18 to 19 mm. and 14 to 15 mm. long, respectively; stigma truncate.

TYPE LOCALITY: La Palma, Province of San José, Costa Rica, altitude 1,700 meters. Type collected by Wercklé (no. 53).

DISTRIBUTION: Mountains of Costa Rica and western Panama, altitude 1,700 to 2,300 meters.

COSTA RICA.

SAN JOSÉ: La Palma, Wercklé 53 (B, type).

PANAMA.

CHIRIQUÍ: Between Alto de las Palmas and Cerro de la Horqueta, Pittier 3206 (F, N); Maxon 5446 (N).

Although the original description gives the length of the rachis as 7 cm., the type specimen is in such poor condition that in the above description I have used the Panama specimens as more illustrative of the plant's usual habit. The Panama specimens have, it is true, somewhat broader leaves and show slight differences in venation, but since they are identical with the type in flower structure I believe them to be conspecific. In foliage this species is larger than the two preceding, to which it is closely allied.

11. *Cavendishia laurifolia* (Klotzsch) Benth. & Hook. Gen. Pl. 2: 570. 1876.

Polyboea laurifolia Klotzsch, Linnaea 24: 31. 1851.

Chupalon laurifolium Kuntze, Rev. Gen. Pl. 2: 383. 1891.

Cavendishia tuerckheimii Hoer. Bot. Jahrb. Engler 42: 323. 1909.

Subscandent shrub, often epiphytic; branchlets subterete, brownish or cinereous, sparsely puberulous when young, becoming glabrous; petioles terete, minutely puberulous or glabrous, 2 to 4 mm. long; leaf blades ovate or oblong-ovate, 5 to 9 cm. long, 2 to 3.5 cm. broad, cuneate or truncate at base, acuminate at apex, entire at margins, glabrous, 5-ply-nerved, the secondary nerves oriented near base, with the midnerve impressed above, prominent beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence terminal or axillary near ends of branchlets, racemose, 10 to 30 flowered; rachis subterete, 3 to 14 cm. long, glabrous; pedicels subrugose, glabrous, 10 to 20 mm. long, each subtended by a papyraceous oblong obovate bract up to 1 cm. long, bibracteolate near base with ovate bractlets 1 to 2 mm. long, swollen at apex; calyx tube short-cylindric, 1 to 2 mm. long and about 3 mm. in diameter at anthesis, sparsely brown-puberulous or subglabrous; limb 2 to 2.5 mm. long, including lobes, the lobes triangular, apiculate, about 1 mm. long, thin-margined and sometimes sparsely glandular-margined; corolla subcylindric, 9 to 10 mm. long, about 4 mm. in diameter, contracted above, sparsely brown-puberulous or glabrous, the lobes triangular, subacute, about 1 mm. long; stamens about 7 mm. and 8 mm. long, respectively; filaments castaneous, distinct, distally puberulous, about 2 mm. and 4 mm. long, respectively; anther sacs nearly smooth, about

2 mm. long; tubules wide, about 3.5 mm. and 3 mm. long, respectively; stigma peltate.

TYPE LOCALITY: Department of Alta Verapaz, Guatemala, altitude about 2,150 meters. Type collected by Warszewicz.

DISTRIBUTION: Mountains of southern Mexico and Guatemala, altitude 800 to 2,150 meters.

MEXICO: *Ehrenberg* 630 (B).

CHIAPAS: Tumbala, *Nelson* 3350 (N), 3362 (N).

GUATEMALA.

ALTA VERAPAZ: *Warszewicz* (B, type). Cobán, *von Tuerckheim* 64 (B, type of *C. tuerckheimii*, G, N, Y), II. 1626 (F, G, N, Y). Finca Sepacuité, *Cook & Griggs* 99 (N), 129 (N). Between Panzos and Sepacuité, *Goll* 213 (F, N). Finca Mocca, *Johnson* 134 (N).

This species and the two following were considered by Klotzsch to constitute a distinct genus, *Polyboea*, a view which is somewhat supported by the undeniably close relationship between them. They are readily separated by the characters mentioned in the key. Between the two types here involved there are no important differences.

12. *Cavendishia quereme* (H. B. K.) Benth. & Hook. Gen. Pl. 2:570. 1876.

A description will be found in the section of this treatment dealing with the South American species of this genus.

TYPE LOCALITY: Near Cali, Department of El Valle, Colombia, altitude about 1,000 meters. Type collected by Humboldt and Bonpland.

DISTRIBUTION: Mountains of Costa Rica, also in the Western Cordillera of Colombia, altitude 1,000 to 1,700 meters.

COSTA RICA.

SAN JOSÉ: La Palma, *Wercklé* 11567 (N). La Hondura, *Standley* 36130 (N), 36223 (N), 36552 (N), 37593 (N), 37633 (N), 37807 (N); *Standley & Valerio* 51919 (F, N).

CARTAGO: Orosi, *Pittier* 16610 (N); *Standley* 39832 (N). El Muñeco, *Standley* 33556 (N), 33618 (N); *Standley & Torres* 51400 (N).

Evidently this species is locally common in Costa Rica; the specimens here cited seem identical with those from Colombia.

13. *Cavendishia crassifolia* (Benth.) Hemsl. Biol. Centr. Amer. Bot. 2:273. 1881.

Thibaudia crassifolia Benth. Pl. Hartw. 65. 1840.

Polyboea crassifolia Klotzsch, Linnaea 24:31. 1851.

Chupalon crassifolium Kuntze, Rev. Gen. Pl. 2:383. 1891.

Subscandent shrub, sometimes epiphytic; branchlets subterete, dark brown, glabrous; petioles terete, slightly rugose, glabrous, sometimes nigrescent, 5 to 10 mm. long; leaf blades oblong-ovate, 7 to 13 cm. long, 2.5 to 5 cm. broad, cuneate at base, caudate-acuminate at apex, entire and slightly revolute at margins, glabrous (or very sparsely pilose beneath with appressed brown hairs), 5-plex-nerved (rarely 7-plex-nerved), the secondary nerves oriented near base, with the midnerve slightly impressed above, prominent beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence terminal or axillary, racemose, 10 to 20 flowered; rachis subterete, glabrous, 2 to 5 cm. long; pedicels subrugose, 6 to 11 mm. long, glabrous or minutely brown-puberulous, each subtended by a membranous, oblong or obovate, glabrous bract up to 2 cm. long and 1 cm. broad (bracts deciduous), deciduously bibracteolate near base with oblong lanceolate bractlets about 2 mm. long; calyx tube slightly rugose, subcylindric or broadly campanulate, glabrous or

minutely brown-puberulous, about 2 mm. long and 3 mm. in diameter at anthesis; limb about 2 mm. long including lobes, short-pilose distally with stout brown hairs up to 0.3 mm. long, the lobes triangular, acute, about 1 mm. long, thin-margined and deciduously glandular-margined; corolla subcylindric, about 15 mm. long and 4 to 5 mm. in diameter, glabrous, the lobes triangular, subacute, about 1 mm. long; stamens 12 to 12.5 mm. long; filaments dark castaneous, distinct, sparsely puberulous at margins and ventrally distally, about 2.5 mm. and 4.5 mm. long, respectively; anther sacs nearly smooth, about 2.5 mm. long; tubules wide, 7.5 mm. and 6.5 mm. long, respectively; style slightly exserted, the stigma broadly peltate; young fruit nigrescent, subspherical, glabrous, up to 6 mm. in diameter.

TYPE LOCALITY: Totontepeque, State of Oaxaca, Mexico. Type collected by Hartweg (no. 477).

DISTRIBUTION: Mountains of southern Mexico and Guatemala, altitude 800 to 1,700 meters.

MEXICO: Alpatlahua, *Hanbury* (K).

OAXACA: Totontepeque, *Hartweg* 477 (B, K, type, Y); *Nelson* 778 (N).

Tetelcingo to Choapan, *Reko* 4096 (N).

CHIAPAS: *Ghiesbreght* 645 (G, K). Fenía, *Purpus* 10410 (N, Y).

GUATEMALA.

ALTA VERAPAZ: Between Panzos and Sepacuité, *Goll* 211 (N, Y).

14. *Cavendishia chiapensis* Brandeg. Univ. Calif. Publ. Bot. 6: 188. 1915.

Shrub; branchlets subterete, cinereous, glabrous; petioles subterete, slightly rugose, glabrous or minutely puberulous, 12 to 16 mm. long; leaf blades oblong-ovate, 12 to 15 cm. long, 4 to 6 cm. broad, cuneate or truncate at base, long-acuminate at apex, entire and slightly revolute at margins, essentially glabrous above, glabrous beneath or very sparsely pilose with minute appressed nigrescent hairs, 5 to 7 pinnately-nerved, the secondary nerves oriented near base, with the mid-nerve slightly impressed above, prominent beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence axillary, short-racemose, 10 to 15 flowered, essentially glabrous in all parts (calyces and pedicels sometimes sparsely puberulous with minute stiff hairs), circumscribed at base by numerous deciduous papyraceous oblong bracts about 2 cm. long and 1 cm. broad; rachis angled, 2 to 2.5 cm. long; pedicels subrugose, 10 to 13 mm. long, each subtended by a deciduous bract similar to those at base of raceme, deciduously bibracteolate near base with oblong fimbriate bractlets about 2 mm. long, swollen distally; calyx tube campanulate, about 2 mm. long and 3 mm. in diameter at anthesis; limb about 2.5 mm. long including lobes, the lobes triangular, acute, about 1 mm. long, thin-margined and sparsely glandular-margined; corolla subcylindric, about 15 mm. long and 4 mm. in diameter, the lobes triangular, subacute, about 1 mm. long; stamens alternately slightly unequal; filaments imperfect in our specimens but apparently short; anther sacs slightly granular, about 2.5 mm. long; tubules wide, about 11 mm. and 9.5 mm. long, respectively; stigma peltate; young fruit somewhat nigrescent, subspherical, 5 mm. in diameter or more.

TYPE LOCALITY: Cerro del Boquerón, State of Chiapas, Mexico. Type collected by Purpus (no. 7342).

DISTRIBUTION: Known only from the type collection.

MEXICO.

CHIAPAS: Cerro del Boquerón, *Purpus* 7342 (type collection, F, G, N, Y).

15. *Cavendishia latifolia* Hemsl. Biol. Centr. Amer. Bot. 2:273. 1881.

Chupalon latifolium Kuntze, Rev. Gen. Pl. 2:383. 1891.

Shrub; branchlets subterete; petioles rugose, glabrous, about 10 mm. long; leaf blades ovate-oblong, 11 to 13 cm. long, 6 to 8 cm. broad, rounded at base, short-acuminate at apex, entire at margins, glabrous, 7-plexi-nerved, the secondary nerves oriented near base, with the midnerve slightly impressed above, raised beneath; inflorescence apparently terminal, short-racemose, glabrous in all parts, deciduously bracteate at base; rachis 3 to 4 cm. long; pedicels 10 to 12 mm. long, bracteate at base; calyx tube campanulate, the lobes broad, obtuse, glandular-ciliate; corolla subcylindric, 12 to 16 mm. long; stamens subequal, the filaments and anthers compensatingly unequal; filaments essentially distinct, slightly hirsute.

TYPE LOCALITY: Pueblo Nuevo, southern Mexico. Type collected by Linden (no. 390).

DISTRIBUTION: Known only from the type collection.

I have not seen the type specimen of this species, which is characterized as above on the basis of the original description and a photograph of the type in the herbarium of the New York Botanical Garden.

16. *Cavendishia guatemalensis* Loesener, Bull. Herb. Boiss. II. 3:221. 1903.

Shrub 2 to 4 meters high, probably epiphytic; branchlets angled, brownish or cinereous, glabrous; petioles slightly rugose, glabrous, 5 to 10 mm. long; leaf blades oblong or ovate-oblong, 10 to 15 cm. long, 3.5 to 6.5 cm. broad, rounded or truncate at base, acuminate at apex, entire and slightly revolute at margins, essentially glabrous, 7-plexi-nerved, the secondary nerves oriented near base, with the midnerve slightly impressed above, prominent beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence axillary, short-racemose, 10 to 20 flowered, circumscribed at base and surrounded, when young, by numerous bracts, the bracts broadly ovate or oblong, up to 15 mm. long and 12 mm. broad, papyraceous, densely pubescent without with appressed white hairs up to 0.4 mm. long, the hairs sometimes at margins only; rachis subterete, 2 to 3.5 cm. long, densely and persistently pubescent with lax white hairs about 0.4 mm. long; pedicels rugose, pubescent as the rachis, 8 to 12 mm. long, each subtended by a deciduous bract similar to those at base of racemes, bibracteolate near base with oblong pilose bractlets about 2 mm. long, swollen distally; calyx pilose as the pedicel, the tube broadly campanulate, about 2 mm. long and 4 mm. in diameter at anthesis, the limb about 3 mm. long including lobes, the lobes triangular, acute, 2 mm. long, margined with several erect brown glandular hairs about 0.2 mm. long; corolla subcylindric, 15 to 16 mm. long and 4 to 5 mm. in diameter, densely pilose with pale spreading hairs about 0.3 mm. long, the lobes triangular, subacute, about 1 mm. long; stamens 11 to 11.5 mm. long; filaments castaneous, loosely coherent at base, glabrous or distally puberulous, about 2 mm. and 3.5 mm. long, respectively; anther sacs nearly smooth, about 2.5 mm. long; tubules wide, 7.5 mm. and 7 mm. long, respectively; stigma peltate; young fruit subspherical, becoming subglabrous, up to 7 mm. in diameter.

TYPE LOCALITY: Jacaltenango, Department of Huehuetenango, Guatemala, altitude 2,380 meters. Type collected by Seler (no. 3107).

DISTRIBUTION: Mountains of Guatemala, altitude 1,700 to 2,400 meters.

GUATEMALA.

QUICHÉ: San Miguel Uspantán, *Heyde & Lux* 3184 (F, G, N).

HUEHUETENANGO: Jacaltenango, *Seler* 3107 (type collection, B, N, Y).

ALTA VERAPAZ: Chamá to Cobán, *Johnson* 568 (N).

ZACATEPÉQUEZ: Embaulada, *Heyde & Lux* 4532 (F, G, N).

A very distinctive species, being the only one in Central America in which the inflorescence is uniformly pubescent. Its closest relative is the South American *C. pubescens*.

17. *Cavendishia smithii* Hoer. Bot. Jahrb. Engler 42:328. 1909.

Shrub 1 to 5 meters high, sometimes epiphytic; branchlets subterete, brownish, glabrous or sparsely puberulous; petioles rugose, glabrous, 4 to 10 mm. long (rarely longer), angled or narrowly winged above; leaf blades thickcoriaceous, oblong or oblong-obovate, 6 to 11 (rarely to 17) cm. long, 2.5 to 5 (rarely to 9) cm. broad, cuneate or truncate at base, abruptly caudate-acuminate at apex, entire and slightly revolute at margins, glabrous, 5 (rarely 7) pinnerved, the secondary nerves oriented near base, with the midnerve impressed above, prominent beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary or terminal, short-racemose, 6 to 15 flowered, essentially glabrous in all parts, circumscribed at base and completely enveloped when young by numerous imbricate papyraceous oblong bracts up to 2 cm. long and 1 cm. broad; rachis stout, 1 to 3 cm. long at maturity; pedicels subrugose, 6 to 14 mm. long, each subtended by a deciduous bract similar to those at base of raceme, deciduously bibracteolate near base with oblong bractlets about 3 mm. long; calyx tube campanulate, sometimes very sparsely pilose, about 3 mm. long and 3 mm. in diameter at anthesis; limb about 3 mm. long including lobes, the lobes triangular, acute, sparsely pilose without and densely fimbriate with stout glandular hairs about 0.1 mm. long, the sinuses rounded; corolla 18 to 20 mm. long, about 5 mm. in diameter, slightly contracted above, the lobes triangular, subacute, about 1 mm. long; stamens about 14 mm. and 15 mm. long, respectively; filaments dark castaneous, connate in basal half, sparsely puberulous distally, 3.5 mm. and 5.5 mm. long respectively; anther sacs nearly smooth, incurved at base, 2.5 to 3 mm. long; tubules wide, 9.5 mm. and 7.5 mm. long respectively; stigma truncate; young fruit rugose, subspherical, up to 8 mm. in diameter, surmounted by the persistent calyx limb and style.

TYPE LOCALITY: Volcán Irazú, Province of Cartago, Costa Rica, altitude about 2,500 meters. Type collected by John Donnell Smith (no. 4876).

DISTRIBUTION: Mountains of Nicaragua, Costa Rica, and western Panama, altitude 1,400 to 2,700 meters.

NICARAGUA: *Wright* (G, N). Mombacho Volcano, *Maxon, Harvey & Valentine* 7768 (N).

COSTA RICA: Volcán de Barba, *Hoffmann* 53 (B). Narango, *Oersted* 8572 (Y).

HEREDIA: Yerba Buena, northeast of San Isidro, *Standley & Valerio* 49091 (N).

ALAJUELA: Volcán Poás, *J. D. Smith* 6636 (B, F, G, N, Y); *Tonduz* 10781 (N); *Jiménez* 1030 (N); *Standley* 34878 (N).

SAN JOSÉ: La Palma, *Tonduz* 7462 (F, G, N, Y), 12351 (N), 12657 (N); *Brade* 16333 (N); *Wercklé* 11597 (N), 16684 (N), 17413 (B); *Maxon & Harvey* 7913 (N), 7914 (N); *Standley* 32954 (N), 32987 (N), 32999 (N), 33071 (N), 33088 (N). Las Nubes, *Standley* 38631 (N), 38853 (N). Laguna de la Chonta, *Standley* 42287 (N).

CARTAGO: Volcán Irazú, *J. D. Smith* 4876 (type collection, G, N); *Kuntze* 2346 (N); *Stork* 1264 (F). La Carpintera, *Standley* 35698 (N); *Stork* 1161 (F).

PANAMA: Veraguas, *Bridges* (K).

This is the most common species in Central America and one which shows a good deal of variation, especially in the leaves, which sometimes reach a size

of 17 cm. by 9 cm. The above dimensions are taken from average material. The proportions of leaf length and breadth are fairly constant, but the species is not too clearly separable from the two following. Occasionally in *C. smithii* the calyx is puberulous, but never persistently so.

18. *Cavendishia veraguensis* (Klotzsch) Hemsl. Biol. Centr. Amer. Bot. 2:273. 1881.

Proclesia veraguensis Klotzsch, Linnaea 24:35. 1851.

Chupalon veraguense Kuntze, Rev. Gen. Pl. 2:383. 1891.

Shrub; branchlets subterete or angled, brownish or cinereous, when young pilose with pale spreading hairs about 0.5 mm. long, becoming glabrous; petioles subterete, pilose as the branchlets, 4 to 6 mm. long; leaf blades oblong or lanceolate-oblong, 9 to 14 cm. long, 2.5 to 4 cm. broad, cuneate or truncate at base, long-acuminate at apex, entire and slightly revolute at margins, essentially glabrous above, glabrous beneath or very sparsely puberulous on nerves at base, 5-plexi-nerved, the secondary nerves impressed above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary, short-racemose, 5 to 12 flowered, circumscribed at base and completely enveloped when young by numerous, closely imbricate, papyraceous, glabrous, oblong bracts up to 2.5 cm. long and 1.5 cm. broad; rachis subrugose, 1 to 2 cm. long, essentially glabrous; pedicels subrugose, 8 to 12 mm. long, glabrous or sparsely puberulous, each subtended by a deciduous bract similar to those at base of raceme, minutely and deciduously bibracteolate at base; calyx tube short-cylindric or campanulate, 3.5 mm. long, 4 to 5 mm. in diameter at anthesis, short-puberulous at base; limb 1 to 2 mm. long, including lobes, the lobes triangular, apiculate, less than 1 mm. long, sometimes sparsely glandular-margined; corolla cylindric, 19 to 22 mm. long, about 5 mm. in diameter, glabrous or minutely puberulous distally, the lobes triangular, subacute, about 1 mm. long; stamens 17 to 19 mm. long; filaments dark castaneous, stout, distinct, about 3 mm. and 5 mm. long, respectively, pilose, especially distally, with pale hairs up to 0.3 mm. long; anther sacs slightly granular, sometimes subpuberulous, 3.5 to 4.5 mm. long; tubules wide, flexible, about 12 mm. and 10 mm. long, respectively; stigma peltate; young fruit rugose, subspherical, up to 6 mm. in diameter, surmounted by the persistent calyx limb and style.

TYPE LOCALITY: Costa Rica. Type collected by Warszewicz.

DISTRIBUTION: Mountains of Costa Rica, altitude 1,100 to 2,800 meters.

COSTA RICA: Warszewicz (B, type). Cascajal, Lankester 107 (K).

ALAJUELA: Volcán Poás, Pittier 2033 (N, in part).

SAN JOSÉ: La Palma, Brade 2102 (B).

CARTAGO: Volcán Irazú, Oersted 8569 (N, Y). Volcán Turrialba, Pittier 7547 (13089 Herb. Nat. Cost.; F, G, N). El Rosario de Orosi, Pittier 16609 (N, Y).

Distinguished from the following only by the puberulous calyx, a character which may well be questioned as a basis of specific distinction.

19. *Cavendishia costaricensis* Hoer. Bot. Jahrb. Engler 42:326. 1909.

Slender shrub 2 to 5 meters high, sometimes epiphytic; branchlets subterete or angled, brownish, when young puberulous with spreading hairs about 0.2 mm. long, becoming glabrous; petioles subrugose, sparsely puberulous, becoming glabrous, 4 to 10 mm. long, angled above; leaf blades thick-coriaceous, oblong or ovate-oblong, 8 to 14 cm. long, 2.5 to 5 cm. broad, cuneate at base (rarely truncate or subcordate), long-acuminate at apex, entire and slightly revolute at margins, essentially glabrous, 5 to 7 pli-nerved, the secondary nerves oriented near base, with the midnerve impressed above, prominent beneath, the vein-

lets reticulate, slightly raised or nearly plane on both surfaces; inflorescence axillary near ends of branchlets, short-racemose, 8 to 12 flowered, essentially glabrous in all parts, circumscribed at base and completely enveloped when young by numerous, imbricate, papyraceous, oblong or ovate bracts up to 2.5 cm. long and 1.5 cm. broad; rachis stout, 1 cm. long or less; pedicels subterete, 7 to 10 mm. long, each subtended by a deciduous bract similar to those at base of raceme, bibracteolate near base with narrow oblong bractlets 1 to 2 mm. long; calyx tube broadly campanulate, subrugose, about 3 mm. long and 4 mm. in diameter at anthesis; limb about 3 mm. long including lobes, the lobes triangular, acute, about 1.5 mm. long, densely margined with minute glandular hairs, sparsely glandular on exterior surfaces or glabrous; corolla subcylindric, 19 to 24 mm. long, about 5 mm. in diameter, the lobes triangular, subacute, about 1 mm. long; stamens 14 to 18 mm. long; filaments castaneous, distinct or loosely coherent at base, about 3.5 mm. and 5 mm. long, respectively, puberulous within distally with hairs up to 0.3 mm. long; anther sacs sparsely granular, 3.5 to 4 mm. long; tubules bright yellow, wide, flexible, 9 to 10 mm. and 7 to 8 mm. long, respectively; stigma peltate; young fruit rugose, up to 6 mm. in diameter, surmounted by the persistent calyx limb.

TYPE LOCALITY: La Palma, Province of San José, Costa Rica, altitude 1,550 meters. Type collected by Wercklé (no. 54).

DISTRIBUTION: Mountains of Costa Rica, altitude 1,500 to 2,400 meters.

COSTA RICA: *Brade* 2354 (B). Cerro Jucosal, *Stork* 1115 (F). Agua Caliente, *Stork* 1316 (F). San Cristóbal Road, *Stork* 2567 (F).

HEREDIA: Cerro de las Caricias, *Standley & Valerio* 52038 (N), 52276 (N), 52311 (N), 52342 (N). Cerros de Zurquí, *Standley & Valerio* 50415 (N), 50752 (N). Cerros de Las Lajas, *Standley & Valerio* 51589 (N). Yerba Buena, *Standley & Valerio* 50189 (N).

SAN JOSÉ: La Palma, *Wercklé* 54 (B, type). Laguna de la Chonta, *Standley* 42190 (F, N). North of El Copey, *Standley* 42650 (N).

CARTAGO: Cartago, *Stevens* 75 (N); *Stork* 390 (N). La Estrella, *Standley* 39469 (N). Cerro de La Carpintera, *Standley* 34329 (N), 34334 (N), 34467 (N).

20. *Cavendishia hoffmannii* Hoer. Bot. Jahrb. Engler 42:328. 1909.

Shrub; branchlets subterete, rugose, brownish, glabrous; petioles rugose, 4 to 7 mm. long, glabrous; leaf blades oblong, coriaceous, 10 to 15 cm. long, 3.5 to 5 cm. broad, broadly cuneate at base, long-acuminate at apex, entire and often cartilaginous at margins, glabrous and impressed-punctate on both surfaces, 5-ply-nerved, the secondary nerves oriented near base, ascending, with the midnerve impressed above, prominent beneath, the veinlets reticulate, obscure; inflorescence axillary near ends of branchlets, subfasciculate or short-racemose (rachis rarely more than 5 mm. long), essentially glabrous in all parts, 8 to 12 flowered, circumscribed at base by numerous, imbricate, oblong or ovate, papyraceous bracts up to 25 mm. long; pedicels rugose, 5 to 10 mm. long, each subtended by a bract similar to those at base of racemes, deciduously bibracteolate near base; calyx tube subrugose, campanulate, about 3 mm. long and 3.5 mm. in diameter at anthesis, minutely pilose when young; limb about 2 mm. long including lobes, the lobes deltoid, about 1 mm. long and 3 mm. broad, sparsely deciduously glandular-margined; corolla subcylindric, about 20 mm. long and 4 mm. in diameter, the lobes oblong, about 1.5 mm. long; stamens 16 to 17 mm. long; filaments castaneous, distinct, sparsely pilose distally, 3 mm. and 6 mm. long, respectively; anther sacs slightly granular, 3 to 3.5 mm. long; tubules flexible, about 10.5 mm. and 8.5 mm. long, respectively; stigma truncate.

TYPE LOCALITY: Volcán Irazú, Province of Cartago, Costa Rica. Type collected by Hoffmann (no. 141).

DISTRIBUTION: Known only from the type collection.

COSTA RICA.

CARTAGO: Volcán Irazú, *Hoffmann* 141 (B, type).

From the two preceding species this plant is distinguished by having the leaves distinctly punctate on both surfaces. In floral characters the three species are very close, and I should hesitate to describe new species on the slender characters that evidently were considered sufficient by Hoerold.

DOUBTFUL CENTRAL AMERICAN SPECIES

CAVENDISHIA WARSZEWICZII (Klotzsch) Hemsl. Biol. Centr. Amer. Bot. 2: 274. 1881.

Proclesia warszewiczii Klotzsch, Linnaea 24: 35. 1851.

Chupalon warszewiczii Kuntze, Rev. Gen. Pl. 2: 383. 1891.

TYPE LOCALITY: Mountains of Guatemala. Type collected by Warszewicz.

I have not seen the type of this species, which, according to the description, probably allies itself to *C. chiapensis*.

KEY TO SOUTH AMERICAN SPECIES

(Including Panama east of the Canal Zone)

Calyx lobes slightly imbricate, the adjoining margins narrowly overlapping.

Leaves amplexicaul at base, rounded at apex----- 1. *C. complectens*.

Leaves cuneate or subcordate at base, acuminate at apex--- 2. *C. compacta*.

Calyx lobes not imbricate.

Limb of calyx erect or suberect, subcylindric, 3 to 8 mm. long, longer than tube.

Corolla pubescent, the hairs pale, 0.3 mm. long or more.

Branchlets and leaves glabrous; leaves pinnate-veined; calyx 3 or 4 times as long as broad----- 3. *C. lindauiana*.

Branchlets and lower surface of leaves hispid; leaves pinnate-veined; calyx twice as long as broad----- 4. *C. hispida*.

Corolla glabrous.

Calyx lobes callose-thickened.

Branchlets, petioles, and lower surface of leaves pilose.

5. *C. bomareoides*.

Branchlets, petioles, and lower surface of leaves glabrous.

Corolla 25 to 30 mm. long; calyx limb 3 times as long as the strongly apophysate tube----- 6. *C. splachnoides*.

Corolla 13 to 22 mm. long; calyx limb 1 to 2 times as long as the rugose subapophysate tube.

Inflorescence up to 5 cm. long at maturity; filaments connate at base or free, glabrous (Colombia).

Leaves 13 to 16 cm. long; pedicel without teeth at summit; filaments connate at base; stamens about 16 mm. long.

7. *C. amalfiensis*.

Leaves 5 to 7 cm. long; pedicels surmounted by minute teeth; filaments free; stamens about 10 mm. long-- 8. *C. purdiei*.

Inflorescence 10 to 14 cm. long at maturity; filaments free, the long ones pilose (Pacaraima Mountains)----- 9. *C. duidae*.

Calyx lobes not callose-thickened.

Inner bracts margined with short-stalked glands-- 10. *C. adenophora*.

Inner bracts not glandular-margined.

Leaves cordate and subamplexicaul at base, obtuse at apex.

18. *C. subamplexicaulis*.

Leaves cuneate or truncate at base, long-acuminate at apex.

Calyx limb minutely glandular-dotted.

Branchlets and leaves glabrous.

Leaves not more than 10 cm. long and 4 cm. broad; bracts membranous, obviously veined; stamens about one-third as long as corolla----- 11. *C. venosa*.

Leaves up to 20 cm. long and 6 cm. broad; bracts subcoriaceous, obscurely veined; stamens nearly as long as corolla.

12. *C. macrocephala*.

Branchlets and lower surface of leaves pale-pilose.

40. *C. glandulosa*.

Calyx limb not glandular-dotted.

Leaves large, up to 40 cm. long and 16 cm. broad; racemes 15 to 25 cm. long----- 13. *C. grandifolia*.

Leaves smaller, not more than 17 cm. long and 7 cm. broad; racemes less than 9 cm. long.

Inflorescence long-racemose, the rachis 4 to 9 cm. long at maturity ----- 14. *C. tarapotana*.

Inflorescence short, the rachis 1 cm. long or less at maturity.

Pedicels glandular-dotted, the glands short-stalked, deciduous after maturity----- 15. *C. engleriana*.

Pedicels eglandular.

Leaves 2 to 3 times as long as broad (4 to 7 cm. broad); stamens about 23 mm. long (Ecuador).

16. *C. gilgiana*.

Leaves 3 to 4 times as long as broad (about 3 cm. broad); stamens about 17 mm. long (northwestern Colombia).

17. *C. kalbreyeri*.

Limb of calyx erecto-patent, usually shorter than tube (rarely erect, then deeply cleft).

Racemes elongate, the rachis 7 to 20 cm. long at maturity.

Rachis simple, or rarely with a few short lateral branches.

Leaves strongly cordate, subamplexicaul---- 18. *C. subamplexicaulis*.

Leaves truncate or lightly subcordate, not amplexicaul.

Pedicels and rachis puberulous; corolla less than 7 mm. long; leaves up to 6 cm. long, not punctate (Colombia)----- 19. *C. spicata*.

Pedicels and rachis glabrous; corolla 11 to 13 mm. long; leaves 10 to 25 cm. long, densely punctate on both surfaces (Peru).

20. *C. punctatifolia*.

Rachis freely branched, the lateral branches elongate, 5 to 10 in number.

Flowers large, the corolla about 20 mm. long; branchlets and petioles robust; primary rachis averaging 7 mm. in diameter (Colombia).

21. *C. divaricata*.

Flowers smaller, the corolla 10 to 12 mm. long; primary rachis averaging 4 mm. in diameter (Peru and Bolivia)- 22. *C. paniculata*.

Racemes comparatively short, the rachis less than 4 cm. long, slightly longer in some specimens of nos. 26 and 37.

Corolla pubescent with pale persistent hairs.

Leaves attenuate at base; flowers solitary or in pairs, subsessile in leaf axils..... 23. *C. sessiliflora*.

Leaves cuneate, truncate, or subcordate at base; flowers several or many to an inflorescence, pediceled.

Bractlets of pedicels glandular-margined; calyx lobes fimbriate with glandular hairs; leaves rounded or obtuse at apex.

24. *C. killipii*.

Bractlets of pedicels not glandular-margined (except no. 29); calyx lobes not glandular-fimbriate (sometimes with sessile glands); leaves various at apex, seldom rounded.

Lower surface of leaves densely nigrescent-pilose (hairs about 0.2 mm. long, 5 to 8 per sq. mm. of surface (Peru).

25. *C. peruviana*.

Lower surface of leaves glabrous or pale-pilose or sparsely brown-pilose.

Leaves 7 to 9 pli-nerved, 10 to 18 cm. long, pilose beneath; calyx lobes elongate-triangular, usually slightly longer than broad..... 26. *C. pubescens*.

Leaves 5 (rarely 3 or 7) pli-nerved or pinnate-veined; calyx lobes triangular, broader than long.

Calyx tube campanulate or short-cylindric, about 3 mm. long; leaves oblong, ovate, or ovate-lanceolate.

Leaves pilose beneath; calyx lobes glandular-margined.

Corolla about 17 mm. long; leaves up to 8 cm. long, short-acuminate (acumen less than 1 cm. long).

26b. *C. pubescens microphylla*.

Corolla 12 to 14 mm. long; leaves 8 to 11 cm. long, long-acuminate (acumen 1 to 2 cm. long).

27. *C. sillarensis*.

Leaves essentially glabrous beneath; calyx lobes eglandular.

Calyx lobes triangular, 1 to 1.5 mm. long.

Leaves about twice as long as broad.

Leaves 35 to 70 mm. long, 20 to 35 mm. broad, subcordate at base (Venezuela, Colombia, and northern Ecuador)..... 28. *C. cordifolia*.

Leaves 30 to 50 mm. long, 15 to 22 mm. broad, truncate or lightly subcordate at base.

Calyx pale-pilose; leaves 5-nerved, hardly scabridulous above (Ecuador)---- 29. *C. hartwegiana*.

Calyx glabrous or with a few stiff stout brown hairs; leaves 3-nerved, scabridous above (Peru).

30. *C. bracteata*.

Leaves about 3 times as long as broad, usually truncate at base, rarely lightly subcordate.

Branchlets puberulous; leaves usually scabridulous on both surfaces (Colombia).

31. *C. scabriuscula*.

Branchlets usually subglabrous; leaves rarely scabridulous (Peru and Bolivia).

32. *C. beckmanniana*.

Calyx lobes apiculate, less than 1 mm. long (western Colombia)-----

33. *C. montana*.

Calyx tube elongate, subfalcate, 6 to 7 mm. long; leaves elongate-deltoid-----

34. *C. durifolia*.

Corolla glabrous.

Flowers small, the corolla 5 to 10 mm. long.

Leaves broadly ovate, 6 to 9 cm. broad, subsessile; inflorescence few-flowered, crowded in leaf axils; corolla less than 6 mm. long.

35. *C. axillaris*.

Leaves ovate or oblong, not more than 4.5 cm. broad, petioled; inflorescence several to many-flowered; corolla 7 to 10 mm. long.

Apex of leaves subacute or obtusely short-acuminate; leaves 3 to 5 cm. long-----

36. *C. guatapeensis*.

Apex of leaves long-acuminate; leaves 7 to 13 cm. long.

Rachis 2 to 5 cm. long; pedicels 8 to 12 mm. long.

37. *C. quereme*.

Rachis less than 2 cm. long; pedicels 2 to 5 mm. long (rarely more).

Inflorescence subfasciculate; bractlets of pedicels exceeding the calyx in length; calyx campanulate, the lobes large, triangular-ovate-----

38. *C. caudata*.

Inflorescence laxly short-racemose; bractlets absent or very small; calyx cylindric, the lobes small, triangular-apiculate-----

39. *C. oligantha*.

Flowers larger, the corolla at least 10 mm. long.

Calyx tube densely and uniformly covered with minute spherical glands-----

40. *C. glandulosa*.

Calyx tube not gland-covered.

Leaves narrowly lanceolate, up to 1 cm. broad.

41. *C. angustifolia*.

Leaves variously shaped, more than 1.5 cm. broad.

Apex of leaves rounded (rarely obtuse). Plant robust, the branchlets stout, often angled; calyx tube usually rugose; bracts numerous-----

42. *C. obtusa*.

Apex of leaves subacute or acuminate.

Bractlets at base of pedicels linear, 10 to 13 mm. long, glandular-margined; calyx lobes elongate-triangular, each flanked by a nigrescent elongate callose thickening.

43. *C. marginata*.

Bractlets at base of pedicels small; calyx lobes not as above.

Venation of leaves 5-pli-nerved.

Leaves lanceolate-oblong, 5 times as long as broad (20 to 25 cm. long)-----

44. *C. rigidifolia*.

Leaves various, 2 or 3 times as long as broad (up to 15 cm. long).

Calyx tube pilose (at least at base), the hairs pale, about 0.25 mm. long.

Leaves long-acuminate, oblong-lanceolate, 3 times as long as broad (7 to 10 cm. long); pedicels pubescent, the hairs as those of calyx tube (Colombia).

45. *C. lehmannii*.

Leaves acute, ovate, not much longer than broad (3 to 6 cm. long); pedicels essentially glabrous (Ecuador)-----

29. *C. hartwegiana*.

Calyx tube glabrous.

Corolla slender, not more than 2.5 mm. in diameter; plant of slender habit, the petioles usually less than 1 mm. in diameter-----

46. *C. gracilis*.

Corolla 3.5 mm. or more in diameter; habit stouter, the petioles averaging 1.5 mm. or more in diameter.

Bracts, young branchlets, and petioles pilose, the hairs pale, about 0.2 mm. long; leaves subpubescent on principal nerves beneath.

47. *C. pseudopubescens*.

Bracts, young branchlets, and petioles essentially glabrous.

Leaves oblong, subcordate at base, obtusely short-acuminate at apex-----

48. *C. miconioides*.

Leaves ovate-oblong, cuneate or truncate at base, acuminate at apex.

Apex of leaves acuminate (acumen usually less than 1 cm. long); leaves up to 10 (rarely 13) cm. long.

Leaves subcoriaceous, dull, sharply acuminate, predominantly ovate or lanceolate-ovate (western Colombia to Bolivia).

49. *C. acuminata*.

Leaves coriaceous, nitid, predominantly oblong (Venezuela and eastern Colombia).

50. *C. splendens*.

Apex of leaves long-acuminate (acumen about 2 cm. long); leaves 12 to 15 cm. long, dull olivaceous (Peru)---

51. *C. weberbaueri*.

Venation of leaves 7 to 9 pll-nerved.

Nerves oriented near base (rarely joined for more than 1 cm.).

Corolla up to 20 mm. long,

Calyx limb short, the lobes about 1 mm. long (Venezuela and Colombia)-----

50. *C. splendens*.

Calyx limb 2 to 4 mm. long, the lobes usually 1.5 mm. long (Peru)-----

52. *C. ulei*.

Corolla 22 to 30 mm. long.

Bracts glabrous-----

53. *C. capitata*.

Bracts pubescent without-----

54. *C. nobilis*.

Nerves oriented well above the base (coherent 3 to 5 cm.).

55. *C. urbaniana*.

1. *Cavendishia complectens* Hemsl. Biol. Centr. Amer. Bot. 2: 272. 1881.

A description of this species will be found in the earlier portion of this treatment dealing with *Cavendishia* in Central America (p. 448).

TYPE LOCALITY: Costa Rica. Type collected by Endres (no. 257).

DISTRIBUTION: Western Cordillera of Colombia and Ecuador; also in Costa Rica; altitude 1,200 to 2,000 meters.

COLOMBIA.

EL CAUCA: La Gallera, Micay Valley, Killip 7909 (Y).

ECUADOR: Nono, Sodiro 92/36 (B).

The specimens here cited seem identical with those from Costa Rica, where the species is more common. It is an isolated species, not closely related to any other *Cavendishia*.

2. *Cavendishia compacta* A. C. Smith, sp. nov.

Frutex; laminis oblongis basi cuneatis vel subcordatis apice caudato-acuminatis 7-plex-nerviis; inflorescentia racemosa glabra; calycis tubo rugoso breve cylindrico, limbo suberecto quam tubo longiore 5-lobato, lobis anguste imbricatis; corolla subcylindrica; filamentis antherisque compensanter inaequalibus, filamentis subdistinctis subglabris, tubulis quam loculis duplo longioribus.

Shrub; branchlets terete, brownish, glabrous; petioles rugose, terete, 4 to 8 mm. long; leaf blades thick-coriaceous, oblong, 11 to 15 cm. long, 5 to 6 cm. broad, broadly cuneate or subcordate at base, caudate-acuminate at apex (acumen 1.5 cm. long), entire and slightly revolute at margins, glabrous, sparsely punctate on both surfaces, 7-plex-nerved, the secondary nerves oriented above base to a distance of 2 or 3 cm., ascending, with the midnerve slightly impressed above, prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces; inflorescence axillary near ends of branchlets, racemose, 10 to 15 flowered, glabrous in all parts; rachis subterete, swollen at bases of pedicels, 6 to 8 cm. long; pedicels strongly rugose, stout, 2 to 3 mm. in diameter, 2 to 4 mm. long, each subtended by a coriaceous deciduous oblong bract about 20 mm. long and 12 mm. broad; calyx tube strongly rugose, short-cylindric, about 3 mm. long and 4 mm. in diameter at anthesis; limb subcoriaceous, about 5 mm. long including lobes, the lobes ovate-oblong, rounded or obtuse, about 5 mm. long, 3 to 4 mm. broad, thickened at margins, narrowly imbricate; corolla subcylindric, 18 to 20 mm. long, about 5 mm. in diameter, the lobes oblong, subacute, 1.5 mm. long; stamens 15 to 16 mm. long; filaments subnigrescent, distinct or loosely coherent, sparsely pilose at distal margins, 2 to 3 mm. and 4 to 5 mm. long, respectively; anther sacs slightly granular, about 4.5 mm. long; tubules flexible, 10 mm. and 8.5 mm. long, respectively, opening by clefts nearly as long; stigma truncate or subpeltate; young fruit extremely rugose, up to 8 mm. in diameter, surmounted by the persistent imbricate calyx lobes.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected in the Cordillera of El Chocó, Intendencia of El Chocó, Colombia, altitude 1,800 meters, 1851 to 1857, by J. Triana (no. 2699).

DISTRIBUTION: Andes of northwestern Colombia, altitude 1,400 to 1,800 meters.

COLOMBIA.

BOLÍVAR: Boca Antizales, on Río Esmeralda, Pennell 4488 (Y).

This is a species without close relatives, distinguished not only by its imbricate calyx lobes but also by its short-pedicelled flowers and coriaceous bracts. The Pennell specimen is without flowers, but is accompanied by a few corollas of a *Satyria*, which I conclude belong to Pennell 4484 (from the same locality), the type of *Satyria latifolia*.

3. *Cavendishia lindauiana* Hoer. Bot. Jahrb. Engler 42: 330. 1909.

Shrub; branchlets subterete, brownish, essentially glabrous; petioles rugose, stout, glabrous, 7 to 9 mm. long; leaf blades oblong, coriaceous, 13 to 18 cm. long, 4.5 to 6 cm. broad, cordate at base, obtusely acuminate at apex, entire and revolute at margins, glabrous, pinnate-veined, the midvein stout, slightly raised above, very prominent beneath, the secondary veins 4 or 5 to a side, oriented in basal half, arcuate-ascending, nearly plane above, raised beneath, the veinlets copiously reticulate; inflorescence axillary near ends of branchlets, racemose, 15 to 25 flowered; rachis subterete, violaceous, glabrous, 15 to 22 cm. long; pedicels rugose, slender, glabrous, about 5 mm. long when young, increasing to 40 mm. at maturity, each subtended by a submembranous glabrous oblong bract about 2 cm. long and 1 cm. broad, bibracteolate near middle, the bractlets glabrous, oblong, 2 to 3 mm. long; calyx tube rugose, cylindric, about 5 mm. long and 3 mm. in diameter at anthesis, glabrous; limb erect, coriaceous, about 8 mm. long including lobes, the lobes deltoid, subacute, 1.5 to 2 mm. long, callose-thickened; corolla narrowly cylindric, up to 25 mm. long, 3 to 4 mm. in diameter, densely pilose, the hairs pale, spreading, up to 0.5 mm. long; stamens 23 to 24 mm. long; filaments castaneous, slender, distinct, sparsely puberulous ventrally, 1 to 2 mm. and 9 mm. long, respectively; anther sacs slightly granular, 10 mm. and 8 mm. long, respectively; tubules flexible, scabridulous, 13 mm. and 10 mm. long, respectively; stigma truncate.

TYPE LOCALITY: Frontino, Department of Antioquia, Colombia, altitude 800 to 1,700 meters. Type collected by Lehmann (no. 7525).

DISTRIBUTION: Known only from the type collection.

COLOMBIA.

ANTIOQUIA: Frontino, *Lehmann 7525* (B, type).

This species and the following, although doubtless related to one another, are readily distinguished on key characters and are quite remote from other species.

4. *Cavendishia hispida* A. C. Smith, sp. nov.

Frutex; ramulis petiolisque decidue hispido-pilosis; laminis oblongis basi truncatis vel leviter subcordatis apice acuminatis subtus pilosis 7 ad 9 plinerviis; inflorescentia racemosa basi bracteis oblongis deciduis instructa; calycis tubo rugoso subcylindrico, limbo erecto quam tubo longiore 5-lobato, lobis triangularibus callosis; corolla cylindrica dense pubescente; filamentis antherisque compensanter inaequalibus, filamentis distinctis subglabris, tubulis quam oculis duplo longioribus.

Shrub; branchlets terete, deciduously pilose with pale brown hispid hairs about 2 mm. long; pedicels rugose, 6 to 10 mm. long, pilose as the branchlets; leaf blades oblong, 14 to 18 cm. long, 6.5 to 7.5 cm. broad, coriaceous, truncate or lightly subcordate at base, acuminate at apex, entire and narrowly revolute at margins, essentially glabrous above, pilose beneath with hairs like those of the branchlets, 7 to 9 plinerved, the secondary nerves oriented slightly above base, ascending, with the midnerve impressed above, strongly prominent beneath, the veinlets copiously reticulate, impressed above, raised beneath; inflorescence axillary, racemose, 15 to 25 flowered, deciduously bracteate at base; rachis subterete, glabrous, about 5 cm. long; pedicels striate, 5 to 8 mm. long, glabrous, each subtended by a submembranous oblong bract about 15 mm. long, deciduously bibracteolate near base; calyx tube rugose, subcylindric, about 3 mm. long and 3 mm. in diameter at anthesis, glabrous; limb erect, coriaceous, about 4 mm. long including lobes, the lobes triangular, subacute, about 1.5 mm. long, callose-thickened; corolla cylindric, 22 to 25 mm. long, 4 to 5 mm. in diameter, densely pubescent with spreading pale brown hairs about 1 mm.

long, the lobes triangular, about 1.5 mm. long; stamens 20 to 21 mm. long; filaments dark castaneous, slender, distinct, glabrous or slightly pilose distally, 2 mm. and 6 mm. long, respectively; anther sacs slightly granular, about 6 mm. long; tubules about 14 mm. and 10 mm. long respectively, opening by clefts nearly as long; style as long as corolla or slightly exserted, the stigma truncate or subpeltate.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected at Tamaná, Intendencia of El Chocó, Colombia, altitude 250 meters, 1851 to 1857, by J. Triana (no. 2709).

DISTRIBUTION: Known only from the type collection.

Allied to *C. lindauiana*, from which it differs by the hispid lower surface of the leaves and the comparatively short calyx limb, as well as in leaf venation. It is related also to the Costa Rican *C. longiflora* Donn. Smith.

5. *Cavendishia bomareoides* A. C. Smith, sp. nov.

Frutex; ramulis saepe subscandentibus dense pubescentibus; laminis oblongis basi truncatis vel leviter cordatis apice caudato-acuminatis supra decidue puberulentis subtus constanter pilosis 7 ad 9 pli-nerviis; inflorescentia racemosa basi bracteis imbricatis glabris instructa; floribus glabris; calycis tubo rugoso, limbo erecto quam tubo longiore 5-lobato, lobis callosis; corolla subcylindrica, lobis callosis; filamentis antherisque alternatim inaequalibus, filamentis distinctis puberulis, tubulis quam loculis longioribus.

Shrub; branchlets subterete, stout, brownish, densely pubescent with pale brown spreading hairs up to 1 mm. long, becoming subglabrous; petioles subterete, pubescent as the branchlets, 4 to 7 mm. long; leaf blades oblong, coriaceous, 9 to 17 cm. long, 4 to 5.5 cm. broad, truncate or lightly cordate at base, caudate-acuminate at apex, entire and slightly revolute at margins, puberulous above with brownish hairs up to 0.3 mm. long, becoming glabrous, persistently pilose beneath with spreading hairs about 0.7 mm. long, 7 to 9 pli-nerved, the secondary nerves oriented above base, with the midnerve slightly impressed above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence terminal or axillary, racemose, 20 to 30 flowered, circumscribed at base by numerous deciduous imbricate oblong-ovate papyraceous glabrous bracts up to 2.5 cm. long and 2 cm. broad; rachis angled, glabrous, 5 to 7 cm. long at maturity; pedicels subrugose, glabrous, 7 to 12 mm. long, each subtended by a deciduous bract similar to those at base of racemes, bibracteolate near base with oblong bractlets up to 3 mm. long; calyx tube rugose, about 3 mm. long and 3.5 mm. in diameter at anthesis, glabrous; limb erect, cylindric, 5 to 6 mm. long including lobes, the lobes triangular, subacute, about 1 mm. long, callose-thickened at tip; corolla subcylindric, 28 to 30 mm. long, about 5 mm. in diameter, membranous, glabrous, the lobes triangular, subacute, about 1 mm. long, callose-thickened at tip; stamens about 27 mm. long; filaments castaneous, slender, distinct, puberulous distally within with pale lax hairs about 0.4 mm. long, 2 mm. and 8 mm. long, respectively; anther sacs slightly granular, 10 mm. and 8 mm. long, respectively; tubules flexible, 16 mm. and 13 mm. long, respectively, opening by clefts nearly one-half their length; stigma truncate; young fruit extremely rugose, surmounted by the persistent calyx limb.

Type in the herbarium of the New York Botanical Garden, collected on rocky stream bank in forest, Río San Rafael, below Cerro Tatamá, Department of Caldas, Colombia, altitude 2,500 to 2,800 meters, September 7 to 11, 1922, by F. W. Pennell (no. 10402).

DISTRIBUTION: Western Cordillera of Colombia and southern Darién, altitude 500 to 2,800 meters.

PANAMA.

DARIÉN: Cerro de Garagará, Sambú Basin, *Pittier* 5651 (N).

COLOMBIA.

EL CHOCÓ: Dauro, *Toro* 1172 (Y).

The three specimens above cited show some variation, but in all essential characters they seem to me conspecific. The *Toro* collection has the leaves cordate at base, slightly different in texture, and with less pubescence. This species and the four following, of which two also are here described for the first time, form a coherent group of the genus by virtue of their elongate calyx limb with thickened lobes. They are readily distinguished from one another by the characters indicated in the key. The northeastern Andes of Colombia have yielded a surprisingly large number of new species of this genus, but owing to the paucity of herbarium material from this rich region it is as yet impossible to say whether or not these are purely local in distribution. The present species is marked by having the branchlets and the petioles and lower surface of the leaves pilose.

6. *Cavendishia splachnoides* A. C. Smith, sp. nov.

Frutex; laminis oblongis basi truncatis vel leviter subcordatis apice caudato-acuminatis glabris pinnatinerviis; inflorescentia racemosa glabra basi decidue bracteata; calycis tubo rugoso valde apophysato, limbo erecto quam tubo triplo longiore, lobis callosis; corolla subcylindrica; filamentis antherisque compensanter inaequalibus, tubulis quam loculis longioribus.

Shrub; branchlets subterete, brownish, glabrous; petioles slightly rugose, 5 to 7 mm. long, sparsely pilose ventrally or glabrous; leaf blades coriaceous, oblong, 9 to 16 cm. long, 3.5 to 6 cm. broad, truncate or lightly subcordate at base, caudate-acuminate at apex, entire and narrowly revolute at margins, glabrous, pinnate-veined, the midvein slightly impressed or plane above, prominent beneath, the secondary veins 2 or 3 to a side, arcuate-ascending, slightly impressed above, raised beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence subterminal, racemose, 18 to 30 flowered, deciduously bracteate at base, glabrous in all parts; rachis angled, 5 to 9 cm. long; pedicels subterete, 17 to 20 mm. long, each subtended by a deciduous papyraceous oblong bract up to 1.5 cm. long and 1 cm. broad, deciduously bibracteolate near base with bractlets up to 3 mm. long, slightly swollen distally; calyx subcylindric, strongly apophysate at base, the tube strongly rugose, about 2 mm. long and 6 mm. in diameter across the apophysis at anthesis, the limb erect, 6 to 7 mm. long including lobes, the lobes triangular, acute, about 1.5 mm. long, callose-tipped; corolla subcylindric, membranous, 25 to 30 mm. long, 5 to 6 mm. in diameter; stamens about 22 mm. long; filaments castaneous, imperfect in our specimen; anther sacs slightly granular, about 8 mm. and 6 mm. long, respectively; tubules flexible, pale red, about 12 mm. and 10 mm. long, respectively, opening by clefts more than half as long; stigma truncate.

Type in the U. S. National Herbarium, no. 715,929, collected on Cerro de Garagará, Sambú Basin, southern Darién, Panama, altitude 500 to 974 meters, February 7, 1912, by H. Pittier (no. 5647). Another collection from the same locality is *Pittier* 5659 (N).

DISTRIBUTION: Known only from the type locality.

In no other species that I have seen is the calyx so strikingly apophysate as here; the specific name refers to *Splachnum*, a genus of mosses with an apophysate capsule. The above flower dimensions are taken from the only available flower. There is probably some variation. It is not possible to say whether the filaments are free or coherent, pubescent or glabrous.

7. *Cavendishia amalfiensis* Mansf. Notizbl. Bot. Gart. Berlin 9:440. 1925.

Shrub with elongate branches; branchlets terete, cinereous or brownish, glabrous; petioles rugose, glabrous, 4 to 5 mm. long; leaf blades oblong, coriaceous, glabrous, somewhat shining, 13 to 16 cm. long, 3 to 5 cm. broad, subcordate at base, long-acuminate at apex, entire at margins, pinnate-veined, the midvein slightly raised above, prominent beneath, the secondary veins 3 or 4 to a side, the basal pair ascending, the upper pair subspreading, nearly plane above, slightly raised beneath, the veinlets reticulate, slightly raised above; inflorescence axillary near ends of branchlets, racemose, 8 to 12 flowered, glabrous in all parts, deciduously bracteate at base; rachis subterete, striate, about 3 cm. long; pedicels striate, 5 to 10 mm. long, each subtended by a deciduous membranous oblong bract up to 20 mm. long and 12 mm. broad, minutely bibracteolate near base, swollen distally; calyx tube subrugose, slightly apophysate, about 1.5 mm. long and 4 mm. in diameter at anthesis; limb erect, about 4 mm. long including lobes, the lobes triangular, subacute, 1 to 1.5 mm. long, callose-thickened at tip; corolla submembranous, cylindric, about 18 mm. long and 5 mm. in diameter, the lobes triangular, about 1.5 mm. long; stamens equal, about 16 mm. long; filaments membranous, loosely coherent, castaneous, essentially glabrous, about 2 mm. and 5 mm. long, respectively; anther sacs slightly granular, about 5 mm. long; tubules flexible, scabridulous, 9 mm. and 7 mm. long, respectively; stigma truncate.

TYPE LOCALITY: Amalfi, Department of Antioquia, Colombia, altitude about 1,750 meters. Type collected by Kalbreyer (no. 1669).

DISTRIBUTION: Known only from the type collection.

COLOMBIA.

ANTIOQUIA: Amalfi, *Kalbreyer 1669* (B, type, K).

8. *Cavendishia purdiei* A. C. Smith, sp. nov.

Frutex gracilis; laminis oblongis vel lanceolato-oblongis basi truncatis vel leviter subcordatis apice longe acuminatis glabris 5-pli-nerviis; inflorescentia subfasciculata basi bracteis submembranaceis oblongis instructa; pedicellis apice dentes minimos gerentibus; calycis tubo rugoso, limbo erecto quam tubo longiore, lobis triangularibus apice callosis; corolla subcylindrica; filamentis antherisque compensanter inaequalibus, filamentis distinctis subglabris, tubulis quam loculis duplo longioribus.

Slender shrub; branchlets terete, striate, brownish, minutely puberulous, becoming glabrous; petioles slender, 2 to 3 mm. long, essentially glabrous; leaf blades oblong or lanceolate-oblong, 5 to 7 cm. long, 1.2 to 2 cm. broad, truncate or lightly subcordate at base, long-acuminate at apex, entire at margins, glabrous, thin-coriaceous, 5-pli-nerved, the secondary nerves oriented above base, sharply ascending, with the midnerve slightly impressed above, raised beneath, the veinlets copiously reticulate, slightly raised above, prominent beneath; inflorescence axillary near ends of branchlets, subfasciculate, 2 to 5 flowered, circumscribed at base by several submembranous oblong bracts about 2 cm. long, glabrous in all parts; pedicels terete, 3 to 5 mm. long, bracteolate (?), swollen distally and surmounted at apex by a ring of minute cartilaginous teeth; calyx tube rugose, subcylindric, about 2 mm. long and 1.5 mm. in diameter at anthesis; limb erect, subcoriaceous, about 3 mm. long including lobes, the lobes triangular, about 1.5 mm. long and broad, callose-thickened at tip; corolla membranous, subcylindric, 13 to 15 mm. long, about 3 mm. in diameter, the lobes triangular, about 1 mm. long; stamens equal, about 10 mm. long; filaments castaneous, distinct, essentially glabrous, about 1.5 mm. and 4 mm. long, respectively; anthers about 9 mm. and 7 mm. long, respectively, the sacs

slightly granular, about 3 mm. long, the tubules opening by clefts most of their length; stigma truncate.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected in Colombia by W. Purdie.

DISTRIBUTION: Unknown; the type, which is the only specimen yet seen, is without precise data.

Related to the preceding but distinguished by the smaller size of all its parts. It is unfortunate that the specimen is in rather poor condition and that the exact locality is unknown, but there is no doubt that it represents a previously undescribed species.

9. *Cavendishia duidae* A. C. Smith, Bull. Torrey Club 58: 443. 1931.

Low shrub with slender branches; branchlets terete, glabrous; petioles stout, 4 to 7 mm. long, glabrous or subpuberulous; leaf blades coriaceous, ovate-oblong or ovate-lanceolate, 6 to 10 cm. long, 3 to 5.5 cm. broad, glabrous, rounded to a subcordate or truncate base, acuminate at apex, entire and somewhat reflexed at margins, 5-plexi-nerved, the primary nerves impressed above, prominent beneath, the veinlets reticulate, raised above, plane beneath; flowers in terminal racemes, the rachis subterete, glabrous, up to 11 cm. long when mature; bracts papyraceous, pale red, glabrous, ovate, 15 to 25 mm. long, 12 to 15 mm. broad, rounded at apex, entire or crenulate at margins, with 5 to 8 subparallel veins, deciduous; pedicels stout, subterete, glabrous, 8 to 12 mm. long, bracteolate near base; calyx tube cylindric, about 2 mm. long, rugose at base; limb campanulate, 2 to 2.5 mm. long, the lobes triangular, subacute, cartilaginous; corolla membranaceous, cylindric, 18 to 22 mm. long, about 3 mm. in diameter at base; stamens 16 to 17 mm. long, the filaments and anthers compensatingly unequal; filaments loosely connate at base, glabrous or sparsely short-pilose, 2 mm. and 3 to 4 mm. long, respectively; anther sacs slightly granular, about 5.5 mm. and 4.5 mm. long, respectively; tubules membranous, about 11 mm. and 9 mm. long, respectively; style shorter than corolla, the stigma truncate.

TYPE LOCALITY: Summit of Mount Duida, State of Amazonas, Venezuela, altitude about 1,100 meters. Type collected by G. H. H. Tate (no. 1048).

DISTRIBUTION: Pacaraima Mountains of southern Venezuela and British Guiana.

BRITISH GUIANA: (Probably vicinity of Mount Roraima), *Schomburgk* 1018 (K). VENEZUELA.

AMAZONAS: Summit of Mount Duida, *Tate* 703 (Y), 1048 (Y, type). Cerro Yapacana, upper Río Orinoco, 1,000 to 1,200 meters, *Holt & Blake* 708 (N, Y).

BRAZILIAN-VENEZUELAN BOUNDARY: Western foothills of Serra Imeri, near Salto de Huá, *Holt & Blake* 489 (N, Y).

This beautiful plant is the only species of *Cavendishia* yet known from the Pacaraima Mountains; it is to be anticipated from the region between Mount Roraima and Mount Duida. The Schomburgk specimen has slightly narrower leaves.

From its allies the present species is distinguished by its elongate inflorescence and pilose long filaments, as well as by leaf characters.

10. *Cavendishia adenophora* Mansf. Notizbl. Bot. Gart. Berlin 9: 439. 1925.

Subscandent shrub; branchlets subterete or angled, brownish, glabrous; petioles subrugose, 3 to 10 mm. long; leaf blades thick-coriaceous, ovate or oblong-ovate, 7 to 12 cm. long, 3 to 6 cm. broad, truncate, cuneate or rarely subcordate at base, obtuse or subacute at apex, entire and slightly revolute at margins, glabrous, 5 to 7 pli-nerved, the secondary nerves oriented above base, with the midnerve slightly impressed above, prominent beneath, the veinlets

copiously reticulate, slightly raised on both surfaces; inflorescence terminal or axillary, appearing subfasciculate (rachis stout, not more than 1 cm. long), 8 to 15 flowered, circumscribed at base and enveloped when young by numerous imbricate obovate papyraceous bracts up to 3 cm. long and 2 cm. broad; pedicels subterete, glabrous, 5 to 8 mm. long, each subtended by a bract similar in texture to those at base of inflorescence but narrower and persistently margined with numerous stalked glands (glands nigrescent, subspherical, about 0.3 mm. in diameter, supported on stalks about 0.4 mm. long), deciduously bibracteolate near base; calyx tube strongly rugose, coriaceous, subcylindric, about 5 mm. long and 5 mm. in diameter at anthesis; limb erect, about 5 mm. long including lobes, the lobes triangular, acute, about 1 mm. long, each flanked by two linear glands; corolla subcylindric, about 19 mm. long and 5 mm. in diameter, the lobes triangular, subacute, about 1 mm. long; stamens about 15 mm. long; filaments castaneous, distinct or loosely coherent at base, sparsely puberulous within and at margins distally, 2.5 mm. and 7 mm. long, respectively; anther sacs slightly granular, 5 to 6 mm. long; tubules wide, 8 mm. and 5 mm. long, respectively; stigma peltate.

TYPE LOCALITY: Caldera, Department of Antioquia, Colombia, altitude 1,500 to 1,850 meters. Type collected by Kalbreyer (no. 1306).

DISTRIBUTION: Western and Central Cordilleras of Colombia, altitude 1,500 to 2,800 meters.

COLOMBIA: *Dawe* 846 (N). Hatico, *Lehmann* K168 (K). Las Juntas, *Lehmann* K169 (K). Western Cordillera, *Dawe* 849 (K, Y).

ANTIOQUÍA: *Jervise* (K). Caldera, *Kalbreyer* 1306 (B, type, K).

CALDAS: Río San Rafael, below Cerro Tatamá, *Pennell* 10401 (Y).

EL VALLE: La Cumbre, *Pennell & Killip* 5796 (N, Y); *Killip* 11376 (Y).

By its glandular-margined bracts and its nitid coriaceous leaves this species is immediately distinguished from its allies. The specimens from La Cumbre differ from typical material in having the leaf apex caudate-acuminate and the leaves darker in color. The same glandular bracts and characteristic calyx are evidenced, however. The calyx is said to be pink, and the corolla violet or "blue and white."

11. *Cavendishia venosa* A. C. Smith, sp. nov.

Frutex gracilis; laminis papyraceis oblongo-lanceolatis basi cuneatis apice longe acuminatis glabris 5-plex-nerviis; inflorescentia breviter racemosa basi bracteis numerosis oblongo-spathulatis manifeste venosis instructa; floribus glabris; calycis limbo parce glanduloso quam tubo duplo longiore; corolla glabra vel parce glandulosa; staminibus brevibus alternatim inaequalibus, tubulis loculos subaequantibus.

Slender shrub; branchlets terete, rugose, essentially glabrous; petioles slender, subrugose, glabrous, 2 to 3 mm. long; leaf blades papyraceous, oblong-lanceolate, 7 to 10 cm. long, 2 to 3 cm. broad, cuneate at base, long-acuminate at apex, entire at margins, glabrous, 5-nerved from base, the nerves nearly plane above, raised beneath, the veinlets copiously reticulate, raised on both surfaces; inflorescence axillary or subterminal, short-racemose (rachis stout, 5 to 10 mm. long), 8 to 15 flowered, circumscribed at base and enveloped when young by numerous imbricate, oblong-spatulate, submembranous, longitudinally veined bracts up to 4 cm. long and 1 cm. broad; pedicels terete, glabrous, 4 to 6 mm. long, each subtended by a bract similar to those at base of inflorescence; calyx tube coriaceous, campanulate or subglobose, about 2.5 mm. in diameter, glabrous; limb erect, sparsely nigrescent, glandular-dotted, about 6.5 mm. long including lobes, the lobes elongate-triangular, about 2 mm. long, sparsely glandular-margined, the sinuses rounded; corolla submembranous, gla-

brous or sparsely glandular-dotted, about 26 mm. long and 3 mm. in diameter, the lobes triangular, about 1 mm. long; stamens incomplete in our specimens but apparently about one-third as long as corolla, the short anthers about 7 mm. long, the tubules about half as long, opening by elongate clefts, the long anthers and style not seen.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected in Colombia or Ecuador by E. André.

DISTRIBUTION: Andes of Colombia and Ecuador, probably limited to the region between Popayán and Quito.

COLOMBIA.

NARIÑO: Altaquer, *André* (K).

ECUADOR: Rio Pilatón, *Sodiño* 92/20 (B). Armada, *André* 3430 (K).

The specimen designated as the type is the best of the above, although it is completely without geographic data. The species is keyed with the following because of the presence of minute glands upon the calyx, although the two are not very closely allied naturally. The present species bears a close superficial resemblance to *C. purdiei*, from which it can readily be distinguished by the lack of callose-tipped calyx lobes and the presence of glands. The thin obviously veined bracts are also characteristic of *C. venosa*.

12. *Cavendishia macrocephala* A. C. Smith, sp. nov.

Frutex robustus; laminis oblongis basi truncatis apice acuminatis glabris 5 ad 7-pli-nerviis; inflorescentia breviter racemosa basi bracteis magnis oblongis subcoriaceis instructa; floribus glabris; calycis parce nigrescento-glandulosi limbo quam tubo longiore; corolla cylindrica; filamentis antherisque compensanter inaequalibus, filamentis puberulentis, tubulis quam loculis 2 ad 3-plo longioribus.

Robust shrub; branchlets angled, brownish, essentially glabrous; petioles subrugose, glabrous, 5 to 8 mm. long; leaf blades oblong, 12 to 20 cm. long, 4.5 to 6 cm. broad, truncate or lightly subcordate at base, acuminate at apex, entire and slightly revolute at margins, coriaceous, glabrous, 5 to 7 pli-nerved, the secondary nerves oriented near base, with the midnerve impressed above, prominent beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary, short-racemose, appearing subfasciculate (rachis stout, rarely up to 1 cm. in length), 8 to 12 flowered, circumscribed at base and enveloped when young by numerous imbricate subcoriaceous oblong bracts up to 4 cm. long and 2 cm. broad; pedicels rugose, glabrous, 5 to 8 mm. long, each bracteate at base and bibracteolate near base, the bractlets lanceolate, 3 to 7 mm. long; calyx tube prismatic, coriaceous, about 4 mm. long and 3 mm. in diameter at anthesis, glabrous or sparsely glandular; limb erect, 6 to 7 mm. long, sparsely nigrescent glandular-dotted, the lobes lanceolate-triangular, 3 mm. long, 1.5 to 2 mm. broad, membranous at margins and sparsely glandular-fimbriate; corolla cylindric, thin-carnose, glabrous, 22 to 25 mm. long, 4 to 5 mm. in diameter, the lobes triangular, about 1 mm. long; stamens about 22 mm. long; filaments dark castaneous, loosely coherent at base, puberulous within with hairs about 0.2 mm. long, 3 mm. and 7 mm. long, respectively; anther sacs slightly granular, about 5 mm. long; tubules wide, flexible, 16 mm. and 11 mm. long, respectively; stigma truncate.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected at La Ceja, Quindío Region, Department of Tolima, Colombia, altitude 3,200 meters, March 10, 1876, by E. André (no. 2255).

DISTRIBUTION: Central Cordillera of Colombia.

COLOMBIA: *Linden* 949 (K).

A robust plant, readily identified by the minute glands of the calyx, the large bracts, and the ample leaves.

13. *Cavendishia grandifolia* Hoer. Bot. Jahrb. Engler 42:321. 1909.

Robust shrub; branchlets stout, angled, brownish, essentially glabrous; petioles strongly rugose, stout, about 4 mm. in diameter, 18 to 23 mm. long, glabrous; leaf blades thick-coriaceous, oblong or ovate-oblong, 30 to 40 cm. long, 12 to 16 cm. broad, cuneate at base, sharp-acuminate at apex, entire and slightly revolute at margins, on both surfaces glabrous or sparsely pilose with pale stiff hairs about 0.7 mm. long, more noticeably pilose beneath, 7-nerved from base, the principal nerves stout, slightly raised above, prominent beneath, each pinnate-nerved with several pairs of ascending or spreading secondary nerves raised on both surfaces, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary, long-racemose, deciduously bracteate at base, essentially glabrous in all parts; rachis stout, striate, 15 to 25 cm. long; pedicels strongly rugose, 20 to 25 mm. long, deciduously bibracteolate, swollen distally; calyx strongly rugose, the tube apophysate, 1 to 1.5 mm. long, 5 to 6 mm. in diameter, the limb erect, about 5 mm. long including lobes, the lobes triangular, thickened at margins, about 1.5 mm. long and 3 mm. across; other flower parts not seen, but described as: "corolla cylindrico-tubulosa, membranaceo-carnosa, 3.0 cm. longa et 0.4 cm. diam., 5-dentata; dentes triangulares, obtusi, induplicato-valvati; stamina 10 corolla paulo breviora superne subaequilonga, filamentis basi in tubum connatis, 0.1 et 0.9 cm. longis; antherarum inferiores partes 1.3 et 1.1 cm. longae tubulis 2 distinctis 1.5 et 0.9 cm. longis pollen rima longa demittentibus; ovarium 5-loculare; stylus filiformis stigmate truncatulo; discus cupuliformis."

TYPE LOCALITY: Angamarca, near Pangoa, Ecuador. Type collected by Sodiro (no. 92/18c).

DISTRIBUTION: Known only from the type collection.

ECUADOR: Angamarca, near Pangoa, Sodiro 92/18c (B, type).

The magnificent large leaves of this species distinguish it immediately from all others of the genus.

14. *Cavendishia tarapotana* (Meissn.) Benth. & Hook. Gen. Pl. 2:570. 1876.

Thibaudia tarapotana Meissn. in Mart. Fl. Bras. 7:126. 1863.

Chupalon tarapotanum Kuntze, Rev. Gen. Pl. 2:384. 1891.

Shrub; branchlets terete, brownish, slender, glabrous; petioles subterete, glabrous, 7 to 9 mm. long; leaf blades thick-coriaceous, oblong, 9 to 13 cm. long, 3.5 to 5 cm. broad, cuneate at base, caudate-acuminate at apex (acumen about 1.5 cm. long), entire and slightly revolute at margins, glabrous, 5-pinnerved, the secondary nerves oriented near base, with the midnerve slightly impressed above, prominent beneath, the veinlets reticulate, plane on both surfaces; inflorescence axillary or terminal, laxly racemose, 8 to 12-flowered, deciduously bracteate at base, essentially glabrous in all parts; rachis terete, somewhat flexuose, 3 to 6 cm. long; pedicels subterete, slightly rugose, 8 to 14 mm. long, each subtended by a deciduous oblong-obovate papyraceous bract up to 1.5 cm. long and 1 cm. broad, deciduously bibracteolate near base; calyx tube subcylindric, slightly apophysate at base and produced below articulation, about 2 mm. long and 3.5 mm. in diameter at anthesis; limb erect, about 5 mm. long including lobes, the lobes triangular, subacute, 1.5 to 2 mm. long, laterally callose-margined; corolla subcylindric, 18 to 19 mm. long, about 4 mm. in diameter, contracted distally, the lobes triangular, subacute, about 1 mm. long; stamens about 13 mm. and 14 mm. long, respectively; filaments dark castaneous, membranous, distinct, glabrous or sparsely puberulous within distally, 3 mm. and 7 mm. long, respectively; anther sacs slightly granular, 4 to 5 mm. long; tubules flexible, 6 mm. and 4.5 mm. long, respectively; stigma peltate; young

fruit cylindric-sub spherical, about 5 mm. in diameter, surmounted by the persistent withered calyx limb.

TYPE LOCALITY: Río Mayo, near Tarapoto, Department of San Martín, Peru. Type collected by Spruce (no. 4302).

DISTRIBUTION: Rare, on the eastern slopes of the Andes, Colombia to Peru, altitude 1,200 to 1,700 meters.

COLOMBIA.

NORTE DE SANTANDER: Batatal, between Ocaña and Pamplona, *Kalbreyer* 905 (B, K).

ECUADOR: *Spruce* 5074 (G, K, Y).

TUNGURAGUA: Palmera, Río Pastaza, *Tate* 670 (N).

PERU.

SAN MARTÍN: Río Mayo, near Tarapoto, *Spruce* 4302 (K, type, Y).

A very well marked species, of unusual distribution; the Colombian specimens appear quite identical with those from farther south. The calyx limb is only slightly longer than the tube, yet the affinities of the plant appear to be in this section of the genus.

15. *Cavendishia engleriana* Hoer. Bot. Jahrb. Engler 42:327. 1909.

Subscandent shrub; branchlets subterete, striate, brownish, glabrous; petioles terete, glabrous, 6 to 8 mm. long; leaf blades coriaceous, glabrous, oblong, 10 to 14 cm. long, 3 to 4 cm. broad, broadly cuneate or truncate at base, caudate-acuminate at apex, entire and narrowly revolute at margins, 5-nerved from base, the second and third nerves ascending to apex, the fourth and fifth nerves close to margins about half their length, with the midnerve plane or slightly impressed above, prominent beneath, the veinlets reticulate, raised on both surfaces; inflorescence axillary, subfasciculate (rachis stout, not more than 5 mm. long), 5 to 8 flowered, circumscribed at base and enveloped when young by numerous imbricate submembranous ovate-oblong bracts up to 3 cm. long and 1.5 cm. broad; pedicels stramineous, sharply angled, stout, 10 to 13 mm. long, bearing numerous short-stalked glands, each subtended by a deciduous bract, slightly swollen distally; calyx tube strongly rugose, coriaceous, glabrous, much enlarged, broadly campanulate, 3 mm. long, 6 to 7 mm. in diameter at anthesis; limb erect, coriaceous, about 7 mm. long including lobes, the lobes deltoid, acute, 1.5 to 2 mm. long, nigrescent and callose-thickened at margins; corolla thin-carnose, glabrous, cylindric, about 30 mm. long and 4 mm. in diameter; stamens 27 to 28 mm. long; filaments castaneous, distinct, sparsely pilose distally, 1.5 mm. and 10 to 11 mm. long, respectively; anther sacs granular, 9 to 10 mm. long; tubules scabridulous, 18 mm. and 9 mm. long, respectively.

TYPE LOCALITY: Río Pilatón, Ecuador. Type collected by Sodiro (no. 92/19, in part).

DISTRIBUTION: Known only from the type collection.

ECUADOR: Río Pilatón, *Sodiro* 92/19, in part (B, type).

Very closely related to the following, from which it is distinguished by the glandular pedicels, the extraordinarily rugose calyces, and the slightly narrower leaves.

16. *Cavendishia gilgiana* Hoer. Bot. Jahrb. Engler 42:327. 1909.

Robust shrub; branchlets slender, subterete, brownish, glabrous; petioles subrugose, terete, 6 to 9 mm. long; leaf blades oblong, coriaceous, glabrous, 12 to 16 cm. long, 4 to 6.5 cm. broad, cuneate at base, caudate-acuminate at apex (acumen 2 to 3 cm. long), entire and slightly revolute at margins, 5-plied-nerved, the secondary nerves oriented near base (second and third nerves ascending to apex), with the midnerve slightly impressed above, prominent beneath, the

veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary, appearing subfasciculate (rachis about 1 cm. long), 5 to 10 flowered, circumscribed at base and enveloped when young by several imbricate papyraceous oblong-ovate bracts up to 3 cm. long and 2 cm. broad; pedicels rugose, 10 to 15 mm. long, each subtended by a large bract, deciduously bibracteolate near base, the bractlets lanceolate, about 4 mm. long; calyx tube rugose, short-cylindric, about 3 mm. long and 5 mm. in diameter at anthesis; limb erect, about 6 mm. long including lobes, the lobes triangular, about 1 mm. long and 3 mm. broad, thick-margined; corolla thin-carnose, cylindric, about 25 mm. long and 4 mm. in diameter, the lobes triangular, 1.5 mm. long; stamens 22 to 23 mm. long; filaments castaneous, distinct, sparsely puberulous within, 2 mm. and 6 to 7 mm. long, respectively; anther sacs slightly granular, 5 to 6 mm. long; tubules membranous, flexible, 16 mm. and 11 mm. long, respectively; stigma truncate or subpeltate.

TYPE LOCALITY: Alaspongo, Mount Pichincha, Province of Pichincha, Ecuador. Type collected by Sodiro (no. 92/18c).

DISTRIBUTION: Andes of northern Ecuador (and southern Colombia?).

COLOMBIA OR ECUADOR: Mindo, *André* 3841 (K). Piedra ancha, *André* 3458 (K). ECUADOR: Napa, *Sodiro* 92/19 (B, in part).

PICHINCHA: Alaspongo, Mount Pichincha, *Sodiro* 92/18c (B, type).

Probably this species is more remote from the following than is indicated in the key. However, they bear a strong superficial resemblance to each other and appear distinguishable only on points of degree.

17. *Cavendishia kalbreyeri* Mansf. Notizbl. Bot. Gart. Berlin 9: 441. 1925.

Subscandent shrub; branchlets subterete, striate, slender, glabrous; petioles subnigrescent, terete, 4 to 5 mm. long; leaf blades coriaceous, glabrous, oblong, 10 to 12 cm. long, 2.5 to 3.5 cm. broad, cuneate or subattenuate at base, long-acuminate at apex, entire at margins, 5-plexi-nerved, the secondary nerves ascending, oriented slightly above base, with the midnerve nearly plane above, raised beneath, the veinlets reticulate, plane on both surfaces; inflorescence axillary, subfasciculate (peduncle stout, not more than 5 mm. long), 4 to 8 flowered, circumscribed at base and enveloped when young by numerous submembranous oblong bracts up to 3 cm. long and 1 cm. broad, glabrous in all parts; pedicels rugose, 5 to 7 mm. long, each subtended by a large bract, bibracteolate near base, the bractlets oblong-lanceolate, 2 mm. long, deciduously glandular-margined; calyx tube coriaceous, subcylindric, about 3.5 mm. long and 4 mm. in diameter at anthesis; limb erect, about 6 mm. long including lobes, the lobes deltoid, acute, about 2 mm. long, thickened at margins; corolla submembranous, cylindric, up to 23 mm. long and 4 mm. in diameter, the lobes about 1 mm. long; stamens about 17 mm. long; filaments dark castaneous, distinct, glabrous or sparsely puberulous within, 2 mm. and 5 mm. long, respectively; anther sacs slightly granular, 5 to 6 mm. long; tubules submembranous, scabridulous, 11 to 12 mm. and 7 to 8 mm. long, respectively; stigma subpeltate.

TYPE LOCALITY: San José, Department of Antioquía, Colombia, altitude about 2,900 meters. Type collected by Kalbreyer (no. 1620).

DISTRIBUTION: Known only from the type collection.

COLOMBIA.

ANTIOQUÍA: San José, *Kalbreyer* 1620 (B, type, K).

18. *Cavendishia subamplexicaulis* A. C. Smith, sp. nov.

Frutex humilis; laminis coriaceis subsessilibus oblongis basi cordatis subamplexicaulibusque apice obtusis plexi-nerviis; inflorescentia longe racemosa glabra ubique decidue bracteata; calycis rugosi subapophysati limbo tubum

aequante, lobis apiculatis; corolla subcylindrica; staminibus alternatim leviter inaequalibus, filamentis distinctis ad margines pilosis, tubulis quam oculis paullo longioribus.

Low shrub; branchlets subterete, brownish, glabrous; petioles subterete, glabrous, 2 to 3 mm. long; leaf blades coriaceous, appearing sessile, oblong, 7 to 10 cm. long, 3 to 6 cm. broad, strongly cordate and subamplexicaul at base, obtuse at apex, entire at margins, glabrous, sparsely punctate beneath, pinnerved, the lateral veins 4 to 6 to a side, the basal pairs spreading, the upper pairs oriented near base, ascending, with the midnerve nearly plane above, raised beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence terminal or axillary, racemose, 15 to 30 flowered, deciduously bracteate at base, glabrous in all parts; rachis stout, 3 to 4 mm. in diameter, terete, 7 to 9 cm. long at maturity; pedicels 3 or 4 per centimeter of rachis, subterete, 10 to 15 mm. long, each subtended by a deciduous oblong or obovate papyraceous bract up to 2.5 cm. long and 1.2 cm. broad, deciduously bibracteolate near base with ovate-oblong bractlets about 5 mm. long, swollen distally; calyx slightly rugose, greenish yellow, slightly apophysate at base, the tube short-cylindric, about 3 mm. long and 4 to 5 mm. in diameter at anthesis, the limb erect, about 3 mm. long including lobes, the lobes triangular, apiculate, less than 1 mm. long; corolla subcylindric, "white, distally pink," 13 to 15 mm. long, 4 to 5 mm. in diameter, contracted distally, the lobes triangular, subacute, about 1 mm. long; stamens about 13 mm. and 14 mm. long, respectively; filaments castaneous, distinct, pilose at margins with white hairs about 0.2 mm. long, 2 mm. and 4 to 5 mm. long, respectively; anther sacs nearly smooth, about 5.5 mm. long; tubules wide, about 6.5 mm. and 5.5 mm. long, respectively; stigma peltate; young fruit subspherical, fleshy, up to 7 mm. in diameter.

Type in the herbarium of the New York Botanical Garden, collected in shrub zone below Páramo de Chaquiro, Cordillera Occidental, Department of Bolívar, Colombia, altitude 2,800 to 3,100 meters, February 24, 1918, by F. W. Pennell (no. 4299).

DISTRIBUTION: Andes of northwestern Colombia, altitude 2,400 to 3,100 meters. COLOMBIA.

BOLÍVAR: Cascada Chorrón, south of Antizales, Pennell 4378 (Y).

A beautiful plant, of dubious relationship, but readily identified by its cordate-based, subamplexicaul leaves.

19. *Cavendishia spicata* A. C. Smith, sp. nov.

Arbor parva pulcherrima; ramulis petiolisque decidue puberulis; laminis oblongis basi truncatis vel subcuneatis apice obtuse breviter acuminatis subtus minute decidue pilosis 5-pinnerviis; inflorescentia graciliter et longe racemosa basi bracteis parvis instructa; rhachidibus pedicellisque minute puberulis; floribus glabris; calycis limbo tubum subaequante; corolla subcylindrica; filamentis antherisque compensanter inaequalibus, antheris parvis, tubulis quam oculis duplo longioribus.

Low tree; branchlets subterete, cinereous, short-puberulous or glabrous; pedicels subterete, short-puberulous when young, 3 to 5 mm. long; leaf blades coriaceous, oblong, 5 to 6 cm. long, 2 to 3 cm. broad, truncate or subcuneate at base, obtusely short-acuminate at apex, entire and revolute at margins, glabrous or minutely and sparsely pilose above, pilose beneath with sparse minute ascending nigrescent hairs about 0.2 mm. long, becoming glabrous, 5-pinnerved, the secondary nerves oriented above base, with the midnerve slightly impressed above, prominent beneath, the veinlets obscurely reticulate; inflorescence axillary, slenderly racemose, 40 to 70 flowered, bracteate at base with

several minute, imbricate, broadly ovate bractlets up to 2 mm. long; rachis subterete or angled, slender, 10 to 18 cm. long at maturity, puberulous with spreading cinereous hairs about 0.1 mm. long; pedicels 4 to 7 per centimeter of rachis, slightly rugose, puberulous as the rachis, 4 to 5 mm. long, each subtended by a deciduous membranous oblong bractlet 3 to 4 mm. long, slightly swollen distally; calyx rugose, nigrescent, the tube short-cylindric, 1.5 mm. long and 2 mm. in diameter at anthesis, the limb suberect, about 2 mm. long including lobes, the lobes triangular, subacute, less than 1 mm. long, each flanked by 2 or 3 minute stalked glands about 0.1 mm. long; corolla subcylindric, 6 to 7 mm. long, about 3 mm. in diameter, slightly contracted distally, glabrous, the lobes triangular, acute, about 1 mm. long; stamens about 5 mm. long; filaments dark castaneous, loosely connate at base, glabrous or sparsely puberulous within distally, about 1.4 mm. and 2.2 mm. long, respectively; anther sacs nearly smooth, about 1.3 mm. long; tubules wide, about 3 mm. and 2.3 mm. long, respectively, opening by clefts about half their length; style about as long as corolla or slightly exerted, the stigma peltate; young fruit fleshy, nigrescent, subspherical, rugose, 5 to 8 mm. in diameter.

Type in the U. S. National Herbarium, no. 1,143,601, collected in forest on peak southeast of La Cumbre, Department of El Valle, Western Cordillera, Colombia, altitude 2,200 to 2,400 meters, May 14 to 19, 1922, by F. W. Pennell and E. P. Killip (no. 5801). Duplicates at B, Y.

DISTRIBUTION: Known only from the type collection.

The small coriaceous leaves, the long graceful racemes, and the numerous delicate flowers of this plant distinguish it at once. It would be a fine species to introduce into cultivation.

EXPLANATION OF PLATE 15.—*Cavendishia spicata*, from photograph of type sheet. About one-half natural size.

20. *Cavendishia punctatifolia* (R. & P.) Hoer. Bot. Jahrb. Engler 42 : 279. 1909.

Thibaudia punctatifolia R. & P. Fl. Peruv. Chil. 4 : pl. 387. 1802.

Thibaudia punctata R. & P.; St. Hil. Exp. Fam. Nat. 363. 1805.

Cavendishia kraenzliniana Hoer. Bot. Jahrb. Engler 42 : 322. 1909.

Subscandent shrub with branches up to 4 meters long; branchlets stout, subterete, brownish, glabrous; petioles subrugose, 6 to 10 mm. long, stout, 3 to 4 mm. in diameter, glabrous; leaf blades oblong, 12 to 25 cm. long, 6 to 11 cm. broad, truncate at base, subacute or short-acuminate at apex, entire and slightly revolute at margins, glabrous, copiously impressed-punctate on both surfaces (punctations 1 or 2 per square mm.), 7-plex-nerved, the secondary nerves oriented above base, slightly impressed above, very prominent beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence axillary, elongate-racemose, 30 to 60 flowered, deciduously bracteate at base with numerous imbricate ovate fimbriate glabrous bracts up to 2 cm. long and 1.5 cm. broad, glabrous in all parts; rachis angled, stout, 3 to 5 mm. in diameter, 10 to 30 cm. long at maturity; pedicels 1 to 5 per centimeter of rachis, rugose, 10 to 18 mm. long, each subtended by a deciduous bract, minutely bibracteolate near base, swollen distally; calyx strongly rugose, slightly apophysate at base, the tube short-cylindric, about 2.5 mm. long and 3.5 to 4 mm. in diameter at anthesis, the limb suberect, 2 to 3.5 mm. long including lobes, the lobes ovate, apiculate, 1 to 2 mm. long; corolla subcylindric, greenish white, 11 to 14 mm. long, 4 to 5 mm. in diameter, contracted distally, the lobes triangular, subacute, about 1 mm. long; stamens 9 to 10 mm. long; filaments dark castaneous, distinct or loosely coherent at base, sparsely puberulous distally with hairs up to 0.2 mm. long, 2.5 mm. and 3.5 mm. long, respectively; anther sacs nearly

smooth, 3 to 4 mm. long; tubules wide, flexible, about 5 mm. and 4 mm. long, respectively; stigma peltate; young fruit subspherical or broadly conical, up to 10 mm. in diameter.

TYPE LOCALITY: Andes of Peru. Type collected by Ruiz and Pavon (or by Dombey?).

DISTRIBUTION: Andes of central Peru, altitude 1,700 to 3,200 meters.

PERU: *Dombey* 431 (B, type collection?).

HUÁNUCO: Chaglla, *Macbride* 3632 (F).

JUNÍN: Huacapistana, *Weberbauer* 1972 (B, type of *C. kraenzliniana*); *Killip & Smith* 24256 (N, Y). Carpapata, above Huacapistana, *Killip & Smith* 24473 (N, Y).

The species treated in this section of the genus are quite distinct from one another on the characters mentioned in the key; the present species and the preceding differ from the two following by having the rachis unbranched.

21. *Cavendishia divaricata* A. C. Smith, sp. nov.

Frutex robustus; ramulis petiolisque crassis glabris; laminis crasso-coriaceis oblongis basi subcordatis apice subacutis supra leviter punctatis 7-pli-nerviis; inflorescentia paniculata crassa multiflora ubique glabra; calycis rugosi limbo tubum subaequante, lobis magnis ovatis; corolla subcylindrica; filamentis antherisque compensanter inaequalibus, tubulis quam oculis longioribus.

Stout shrub; branchlets thick, frequently 10 mm. in diameter near termination, angled, brownish, glabrous; petioles rugose, stout, about 5 mm. in diameter, 5 to 10 mm. long, glabrous; leaf blades thick-coriaceous, oblong, 12 to 20 cm. long, 6 to 8 cm. broad, lightly subcordate at base, obtuse or subacute at apex, entire and revolute at margins, glabrous, shallowly punctate above, 7-pli-nerved, the secondary nerves oriented slightly above base, with the midnerve impressed above, very prominent beneath, the veinlets reticulate, plane above, slightly raised beneath; inflorescence axillary near ends of branchlets, paniced, 50 to 100 flowered, deciduously bracteate at base, glabrous in all parts; branches of inflorescence angled, stout, up to 8 mm. in diameter, the primary branch 20 to 30 cm. long, with about 10 secondary branches up to 15 cm. long, and with tertiary branches sometimes present, up to 4 cm. long; pedicels 1 or 2 per centimeter of rachis, rugose, 10 to 20 mm. long, each subtended by a deciduous papyraceous oblong bract up to 25 mm. long and 10 mm. broad, deciduously bibracteolate near base; calyx rugose, the tube short-cylindric, about 2.5 mm. long and 4 mm. in diameter at anthesis, the limb spreading, 4 mm. long including lobes, the lobes ovate, apiculate, about 3 mm. long, thick-margined except at apex; corolla subcylindric or elongate-urceolate, grayish red, 20 to 22 mm. long, 7 to 8 mm. in diameter, contracted distally, the lobes triangular, subacute, about 2 mm. long; stamens 16 to 17 mm. long; filaments castaneous, distinct, pilose ventrally and at margins distally with hairs up to 0.4 mm. long, 2.5 mm. and 3.5 mm. long, respectively; anther sacs slightly granular, incurved at base, about 5 mm. long; tubules wide, about 9.5 mm. and 9 mm. long, respectively; style about as long as corolla or slightly exserted, the stigma peltate; fruit coriaceous, strongly rugose, dark red, up to 12 mm. in diameter.

Type in the herbarium of the New York Botanical Garden, collected in forest at San José, near San Antonio, Department of El Cauca, Western Cordillera, Colombia, altitude 2,400 to 2,700 meters, June 30, 1922, by F. W. Pennell (no. 7557). Duplicate in the U. S. National Herbarium.

DISTRIBUTION: Western and Central Cordilleras of southern Colombia, altitude 2,300 to 2,800 meters.

COLOMBIA.

EL CAUCA: San Antonio, *Pennell & Killip* 7384 (Y). Central Cordillera, near Popayán, *Lehmann* 4763 (K).

As noted in the key, this species is marked by its robust habit and copiously branching inflorescence. The stamens frequently show very slight variations, and casual dissection might lead one to consider them isomorphic.

22. *Cavendishia paniculata* Rusby, Mem. Torrey Club 4: 215. 1895.

Chupalon viridiflorum Kuntze, Rev. Gen. Pl. 3²: 190. 1898.

Thibaudia viridiflora K. Schum. Just's Bot. Jahresb. 26¹: 385. 1900.

Cavendishia muschleriana Hoer. Bot. Jahrb. Engler 42: 326. 1909.

Shrub or low tree 3 to 6 meters high with drooping branches; branchlets subterete or irregularly striate, brownish, sparsely pubescent when young, becoming glabrous; petioles subrugose, narrowly angled, sparsely puberulous when young, becoming glabrous, 5 to 10 mm. long; leaf blades thick-coriaceous, oblong, somewhat bullate, 9 to 20 cm. long, 5 to 9 cm. broad, lightly subcordate or truncate at base, acute or acuminate at apex, entire and slightly revolute at margins, glabrous above, finely puberulous beneath with spreading white hairs up to 0.3 mm. long, also bearing scattered castaneous glandular hairs about 0.2 mm. long, becoming essentially glabrous, 7-plex-nerved, the secondary nerves oriented near base, impressed above, prominent beneath, the veinlets reticulate, plane above, slightly raised beneath; inflorescence terminal or axillary, paniced, 50 to 150 flowered, deciduously bracteate at base; branches of inflorescence subterete or angled, sparsely puberulous or glabrous, somewhat lax, the primary branch 8 to 25 cm. long, the secondary branches 5 to 10, ascending, somewhat flexuose, 6 to 12 cm. long, the tertiary branches often present, up to 6 cm. long; pedicels 1 to 3 per centimeter of rachis, subrugose, glabrous, 5 to 12 mm. long, each subtended by a deciduous bract up to 1 cm. long and minutely bibracteolate near base with membranous ovate bractlets up to 2 mm. long; calyx rugose, the tube subcylindric or slightly angled to the sinuses, sometimes slightly apophysate at base, glabrous, 2 to 2.5 mm. long, 3 to 4 mm. in diameter at anthesis, the limb spreading, 2 to 2.5 mm. long including lobes, the lobes ovate, apiculate, about 1.5 mm. long, thick-margined; corolla subcylindric, 10 to 11 mm. long, 4 to 5 mm. in diameter, contracted distally, the lobes triangular, subacute, about 1 mm. long; stamens 7.5 to 8.5 mm. long; filaments castaneous, distinct, sparsely puberulous distally, about 2 mm. and 3 lobes triangular, subacute, about 1 mm. long; stamens 7.5 to 8.5 mm. long; tubules wide, about 5 mm. and 4 mm. long, respectively; young fruit subspherical, rigidly coriaceous, up to 8 mm. in diameter.

TYPE LOCALITY: Yungas, Bolivia. Type collected by Bang (no. 721).

DISTRIBUTION: Andes of southern Peru and northern Bolivia, altitude 750 to 2,400 meters.

PERU.

AYACUCHO: Aina, between Huanta and Río Apurímac, *Killip & Smith* 22199 (N, Y). Ccarrapa, between Huanta and Río Apurímac, *Killip & Smith* 22432 (N, Y).

CUZCO: Near Santa Ana, Province Convención, *Weberbauer* 5009 (B, type of *C. muschleriana*). Cerro de Cusilluyoc, *Pennell* 13962 (F). Machu Picchu, *Cook & Gilbert* 862 (N).

BOLIVIA: *Bang* 721 (F, G, N, Y, type). Río Juntas, *Kuntze*, in April, 1892 (Y, type of *Chupalon viridiflorum*).

LA PAZ: Mapiri, *Rusby* 2403 (Y). Tipuani, *Buchtien* 7612 (B, Y). La Joya, Cordillera Real, *Tate* 1048 (Y).

A very well marked and coherent species, the three types involved showing no essential differences. A local name in southern Peru is "monte frutilla."

23. *Cavendishia sessiliflora* A. C. Smith, sp. nov.

Frutex; laminis ovatis vel leviter obovatis basi anguste attenuatis apice obtusis 3 ad 5 pli-nerviis; floribus axillaribus solitariis vel binis basi bracteis minutis instructis dense albo-pubescentibus; calycis subcampanulati limbo quam tubo paullo brevior; corolla subcylindrica; filamentis antherisque compensanter inaequalibus, tubulis quam loculis longioribus.

Shrub; branchlets subterete, slightly rugose, glabrous; petioles rugose, essentially glabrous, angled or narrowly winged above, 4 to 6 mm. long; leaf blades ovate or slightly obovate, 3 to 5 cm. long, 1.5 to 2.5 cm. broad, narrowly attenuate at base, obtuse at apex, entire and slightly revolute at margins, thick-coriaceous, glabrous and shining above, glabrous and sparsely brown-punctate beneath, 3 to 5 pli-nerved, the midnerve slightly impressed above, raised beneath, the secondary veins oriented above base, arcuate, nearly plane above, slightly raised beneath, the veinlets obscurely reticulate; flowers axillary, solitary or in pairs, circumscribed at base by a few submembranous ovate puberulous bractlets up to 3 mm. long; pedicels subterete, about 1 mm. long, bibracteolate at base with similar bractlets, pubescent as the calyx; calyx strongly rugose, densely white-pubescent with spreading hairs up to 0.3 mm. long, the tube subcylindric or campanulate, 3 to 4 mm. long and about 3 mm. in diameter at anthesis, the limb suberect, 2 to 3 mm. long including lobes, the lobes triangular, subacute, 1.5 to 2 mm. long, pubescent as the tube and also distally pilose with a few appressed brown hairs about 0.3 mm. long; corolla subcylindric, 9 to 11 mm. long, 3 to 4 mm. in diameter, contracted at base and apex, pilose with persistent short spreading hairs as the calyx, the lobes triangular, subacute, about 1 mm. long; stamens subequal (alternate filaments and anthers compensatingly unequal), 7 to 8 mm. long; filaments nigrescent, glabrous or sparsely puberulous distally, about 2 mm. and 3.5 mm. long, respectively; anther sacs slightly granular, 2 to 3 mm. long; tubules flexible, about 5 mm. and 4 mm. long, respectively, opening by clefts nearly as long; stigma truncate.

Type in the herbarium of the New York Botanical Garden, collected in forest above Cascada Chorrón, south of Antizales, Department of Bolívar, Colombia, altitude 2,400 to 2,800 meters, February 25, 1918, by F. W. Pennell (no. 4377).

DISTRIBUTION: Andes of northwestern Colombia.

COLOMBIA.

BOLÍVAR: Río Sinú, *Pennell* 4780 (Y).

Like many other plants from the northwestern section of Colombia, this species is apparently local in distribution and is quite isolated from other species of the genus. It is immediately distinguished by its attenuate-based leaves, its essentially solitary subsessile flowers, and its pilose corolla.

24. *Cavendishia killipii* A. C. Smith, sp. nov.

Frutex; ramulis petiolisque pilosis; laminis oblongo-ellipticis basi cuneatis apice rotundatis subtus pilosis 5 ad 7 pli-nerviis; inflorescentia subfasciculata basi bracteis submembranaceis oblongis glabris instructa; floribus albo-pilosis; calycis subcampanulati limbo quam tubo brevior glanduloso-marginato; corolla subcylindrica; filamentis antherisque compensanter inaequalibus, tubulis quam loculis longioribus.

Spreading shrub 2 to 4 meters high; branchlets terete, cinereous, pilose with pale spreading hairs about 0.2 mm. long, becoming glabrous; petioles subrugose, pilose as the branchlets, 3 to 5 mm. long; leaf blades oblong-elliptic, 5 to 7 cm.

long, 2 to 2.5 cm. broad, cuneate at base, rounded at apex, entire and slightly revolute at margins, short-pilose above on nerves and at margins, pilose beneath on nerves with stiff hairs about 0.3 mm. long, also with scattered deciduous appressed brownish hairs about 0.2 mm. long, 5 to 7 pli-nerved, the secondary nerves oriented slightly above base, ascending, with the midnerve slightly impressed above, raised beneath, the veinlets reticulate, slightly raised above; inflorescence axillary or terminal, subfasciculate, 8 to 15 flowered, bracteate at base and enveloped when young by several imbricate, submembranous, deep red, oblong, glabrous bracts up to 2 cm. long and 1 cm. broad; pedicels subrugose, sparsely puberulous, 4 to 5 mm. long, each subtended by a deciduous bract similar to those at base of inflorescence, bibracteolate near base with submembranous oblong-lanceolate glandular-margined bractlets 2 to 2.5 mm. long; calyx subcoriaceous, densely pubescent with spreading white hairs up to 0.3 mm. long, the tube subcylindric or campanulate, about 3 mm. long and 2.5 mm. in diameter at anthesis, the limb suberect, about 2 mm. long including lobes, the lobes triangular, acute, about 1 mm. long, fimbriate with numerous glandular hairs about 0.2 mm. long, the sinuses rounded; corolla red, pinkish white distally, subcylindric, 11 to 12 mm. long, about 3.5 mm. in diameter, pilose as the calyx, the lobes oblong, subacute, 2 to 2.5 mm. long; stamens subequal (alternate filaments and anthers compensatingly unequal), 10 to 10.5 mm. long; filaments castaneous, slender, distinct, sparsely puberulous distally, about 2.5 mm. and 5 mm. long, respectively; anther sacs slightly granular, about 3 mm. long; tubules wide, about 5.5 mm. and 3 mm. long, respectively, opening by clefts nearly as long; stigma peltate.

Type in the U. S. National Herbarium, no. 1,351,059, collected in woods on Mesa de los Santos, Department of Santander, Eastern Cordillera, Colombia, altitude 1,500 meters, December 12, 1926, by E. P. Killip and A. C. Smith (no. 15124). Duplicate at Y.

DISTRIBUTION: Known only from the type collection.

This species, which is probably closest related to *C. pubescens*, is quite distinct on the basis of its smaller leaves (obtuse at apex) and its glandular-margined bractlets and calyx lobes.

25. *Cavendishia peruviana* Hoer. Bot. Jahrb. Engler 42: 332. 1909.

Compact shrub; branchlets subterete or angled, brownish, glabrous; petioles nigrescent, rugose, stout, glabrous, 5 to 6 mm. long; leaf blades oblong, 11 to 14 cm. long, 2.5 to 5 cm. broad, truncate at base, obtusely short-acuminate at apex, entire and revolute at margins, thick-coriaceous, glabrous above, pilose beneath (hairs nigrescent, appressed, stout, about 0.2 mm. long, 5 to 8 per square millimeter of surface), 7 to 9 pli-nerved, the secondary nerves oriented above base, ascending, with the midnerve impressed above, prominent beneath; inflorescence axillary, subfasciculate (rachis stout, elongating at maturity to 3 cm.), 10 to 20 flowered, bracteate at base and enveloped when young by several imbricate, subcoriaceous, externally pale-pilose, ovate bracts up to 2 cm. long and 1.5 cm. broad; pedicels subterete, glabrous, about 10 mm. long, deciduously bibracteolate at base; calyx tube coriaceous, sparsely pilose or glabrous, campanulate, about 3.5 mm. long and 4 mm. in diameter at anthesis; limb erecto-patent, about 2 mm. long including lobes, the lobes deltoid, 1.5 mm. long, sparsely glandular-margined; corolla thin-carnose, cylindric, about 14 mm. long and 4 mm. in diameter, pale pilose with short spreading hairs, becoming subglabrous, the lobes triangular, about 1 mm. long; stamens 11 to 12 mm. long; filaments nigrescent, distinct, puberulous, about 2.5 mm. and 4 mm. long, respectively; anther sacs slightly granular, about 3.5 mm. long; tubules wide, about 7 mm. and 5.5 mm. long, respectively; stigma truncate.

TYPE LOCALITY: Between the tambos Jehubamba and Yuncacoya, between Sandía and Chunchusmayo, Department of Cuzco, Peru, altitude 1,800 to 2,600 meters. Type collected by Weberbauer (no. 1081).

DISTRIBUTION: Known only from the type collection.

PERU.

Cuzco: Between Sandía and Chunchusmayo, *Weberbauer* 1081 (B, type).

In its pubescent bracts and flowers this species shares the characters of *C. pubescens*, from which it is distinguished by the different type of pubescence on the lower surface of leaves.

26. *Cavendishia pubescens* (H. B. K.) Hemsl. Biol. Centr. Amer. Bot. 2: 273. 1881.

Thibaudia pubescens H. B. K. Nov. Gen. & Sp. 3: 273. 1818.

?*Thibaudia oblongifolia* Remy, Ann. Sci. Nat. III. Bot. 8: 233. 1847.

Proclesia pubescens Klotzsch, Linnaea 24: 33. 1851.

Thibaudia cinnamomifolia Willd.; Walp. Ann. Bot. 2: 1087. 1852, as synonym.

Thibaudia septemnervia Willd.; Walp. Ann. Bot. 2: 1087. 1852, as synonym.

Polyboea velutina Griseb.; Lechl. Berb. Amer. Austr. 58. 1857, nomen.

Chupalon pubescens Kuntze, Rev. Gen. Pl. 2: 383. 1891.

Shrub or small tree to 5 meters high; branchlets subterete, brownish, softly tomentose with pale spreading hairs up to 0.5 mm. long, becoming glabrous with age; petioles subterete, pilose as the branchlets, 6 to 10 mm. long; leaf blades oblong or ovate-oblong, 10 to 20 cm. long, 4 to 9 cm. broad, cuneate at base, acuminate or caudate-acuminate at apex, entire and slightly revolute at margins, glabrous or short-pilose above, pilose beneath, especially on nerves, with pale spreading hairs up to 0.5 mm. long, 5 to 7 pli-nerved, the secondary nerves oriented above base, ascending, with the midnerve slightly impressed above, prominent beneath, the veinlets slightly raised on both surfaces; inflorescence axillary or terminal, racemose, 10 to 25 flowered, circumscribed at base and enveloped when young by numerous imbricate bracts, the bracts oblong-ovate, submembranous, up to 25 mm. long and 15 mm. broad, densely short-pilose without, becoming glabrous, thin-margined; rachis 1 to 4 cm. long at maturity (rarely to 7 cm. long), stout, often to 5 mm. in diameter, densely pilose as the branchlets; pedicels subterete, striate, densely pilose with pale spreading hairs up to 0.3 mm. long, 6 to 10 mm. long, each subtended by a deciduous bract similar to those at base of inflorescence, deciduously bibracteolate near base with oblong pilose bractlets 2 to 3 mm. long, slightly swollen distally; calyx tube short-cylindric or campanulate, densely pilose with appressed white hairs about 0.2 mm. long, 3.5 to 5 mm. long, 3 to 5 mm. in diameter at anthesis; limb suberect, 2.5 to 5 mm. long including lobes, slightly less pilose than the tube, the lobes triangular or lanceolate-triangular, acute, 2 to 4 mm. long, deciduously glandular-margined, the sinuses sharp; corolla subcylindric, 20 to 26 mm. long, 4 to 6 mm. in diameter, slightly contracted distally, pilose as calyx, the lobes triangular, subacute, 1 to 1.5 mm. long; stamens 13 to 18 mm. long; filaments dark castaneous, distinct or loosely coherent at base, pilose ventrally and at margins distally, 3 to 4 mm. and 5 to 8 mm. long, respectively; anther sacs granular, 5 to 8 mm. long; tubules wide, about 9 mm. and 7 mm. long, respectively, opening by clefts nearly as long; stigma peltate; fruit spherical, up to 12 mm. in diameter, densely and persistently pilose, surmounted by the persistent calyx limb and style.

TYPE LOCALITY: Near Caracas, Federal District, Venezuela. Type collected by Humboldt and Bonpland.

DISTRIBUTION: Common throughout the Andes, from Venezuela to Bolivia, altitude 600 to 3,000 meters.

This is a well-marked species which falls into several forms, none of which seem to me to merit varietal rank, although two have been recognized as varieties by Hoerold. In this treatment his names are retained, but no new ones are added.

The above flower description is taken from a typical specimen from eastern Colombia. There is great variation in flower dimensions, the stamens ranging from 11 to 20 mm. in length, depending upon habitat. The dense pubescence of the flowers is usually sufficiently well marked to identify the plant; the elongate calyx lobes also are characteristic. A local name in Colombia is "uva de monte."

The typical form, with densely pubescent calyx, elongate calyx lobes, and long-acuminate leaves, is represented by the following specimens:

VENEZUELA: *Curran & Haman* 1118 (G).

FEDERAL DISTRICT: Caracas and vicinity: *Humboldt & Bonpland* (B, type); *Berschel* (K); *L. H. & E. Z. Bailey* 992 (Y); *Pittier* 5872 (N, Y), 9175 (G, N, Y). Galipán, *Kuntze* 1572 (N, Y); *E. Pittier* 81 (N, Y).

ARAGUA: Colonia Tovar, *Fendler* 738 (G, Y).

TRUJILLO: Between Valera and Monte Carmelo, *de Bellard* (N).

MÉRIDA: *Moritz* 1346 (B).

COLOMBIA: *Purdie* (K); *Goudot* (K).

NORTE DE SANTANDER: Toledo, *Killip & Smith* 20055 (N, Y).

SANTANDER: Between Piedecuesta and Las Vegas, *Killip & Smith* 15465 (N, Y), 15918 (N, Y). Charta, *Killip & Smith* 18883 (N, Y), 19039 (N, Y), 19091 (N, Y), 19308 (N, Y). Tona, *Killip & Smith* 19435 (N, Y), 19460 (N, Y).

CUNDINAMARCA: Fusagasugá, *Tracey* 336 (K); *Pennell* 2695 (N, Y).

TOLIMA (?): Quindío Region, *André* (K); *Holton* 634 (Y).

HUILA: East of Neiva, *Rusby & Pennell* 939 (F, G, N, Y), 563 (Y).

ANTIOQUÍA: South of Caldas, *Pennell* 10933 (N, Y). Fredonia, *Toro* 191 (Y). Quebrada del Ato, *Archer* 176 (N). Río Negro, *Archer* 316 (N, Y). Medellín, *Archer* 1363 (N, Y), 1592 (N, Y).

CALDAS: North of Supía, *Pennell* 10722 (Y), 10744 (N, Y).

PERU: *Macleay* (K). Tabina, *Leohler* 1924a (K).

Cuzco: Sandía, *Weberbauer* 594 (B).

BOLIVIA: *Pentland* (K).

LA PAZ: Milliguaya, *Buchtien* 715 (F, Y). Coroico, *Pearce*, in March, 1866 (K); *Buchtien* 3870 (Y). Yungas, *Rusby* 2033 (F, G, N, Y); *Bang* 290 (F, G, N, Y). Sirupaya, *Buchtien* 503 (N, Y).

A form more glabrous throughout than the above specimens, distributed locally in Colombia, Peru, and Bolivia, is represented by the following specimens:

COLOMBIA.

TOLIMA: Ibagué, *Triana* 2668 (Y). Murillo, *Pennell* 3192 (N, Y).

PERU: *Ruiz & Pavón* (K).

JUNÍN: Carpapata, *Killip & Smith* 24489 (N, Y). San Ramón, *Killip & Smith* 24882 (N, Y). Pichis Trail, Porvenir, *Killip & Smith* 25938 (N, Y).

BOLIVIA.

COCHABAMBA: Locotal, *Steinbach* 9023 (Y).

- 26a. *Cavendishia pubescens* var. *boliviensis* Hoer. Bot. Jahrb. Engler 42: 332. 1909.

A form with more slender, bluntly acuminate leaves.

TYPE LOCALITY: Between Guanai and Tipuani, Department of La Paz, Bolivia. Type collected by Bang (no. 1383).

BOLIVIA.

LA PAZ: Between Guanai and Tipuani, *Bang* 1383 (B, type, F, G, N, Y).

- 26b. *Cavendishia pubescens* var. *microphylla* Hoer. Bot. Jahrb. Engler 42: 332. 1909.

A form smaller in all parts, the leaves about 6 cm. long and 3 cm. broad.

TYPE LOCALITY: Peru. Type collected by Weberbauer (no. 1081a).

PERU: *Weberbauer* 1081a (B, type).

27. *Cavendishia sillarensis* Herzog, Med. Rijks. Herb. Leiden 27:20. 1915.

Compact branching shrub; branchlets subterete, striate, cinerous, deciduously pilose with pale spreading hairs up to 0.2 mm. long; petioles terete, subrugose, pilose as the branchlets, 5 to 7 mm. long; leaf blades oblong or ovate-oblong, 8 to 11 cm. long, 3.5 to 4.5 cm. broad, truncate or broadly cuneate at base, caudate-acuminate at apex, entire and slightly revolute at margins, coriaceous, glabrous and shining above, pilose beneath (hairs pale, spreading, densest on nerves, up to 0.4 mm. long), 5 (rarely 7) pli-nerved, the secondary nerves oriented near base, arcuate-ascending, with the midnerve slightly impressed above, prominent beneath, the veinlets reticulate, plane on both surfaces; inflorescence axillary, short-racemose at maturity (rachis glabrous, 2 to 3 cm. long), 10 to 15 flowered, bracteate at base and enveloped when young by several imbricate submembranous oblong bracts up to 15 mm. long and 8 mm. broad; pedicels striate, glabrous, 8 to 10 mm. long, each bracteate at base and deciduously bracteolate near base; calyx coriaceous, deciduously white-pilose, the tube campanulate, about 2 mm. long and 3 mm. in diameter at anthesis, the limb suberect, 2 to 3 mm. long including lobes, the lobes broadly triangular, about 1.5 mm. long, densely glandular-margined; corolla thin-carnose, sparsely pale-pilose, cylindric, 12 to 14 mm. long, about 4 mm. in diameter, the lobes deltoid, about 1 mm. long; stamens 10 to 11 mm. long; filaments dark castaneous, distinct, distally pilose, about 2 mm. and 3.5 mm. long, respectively; anther sacs 2 to 3 mm. long; tubules submembranous, about 7 mm. and 6 mm. long, respectively; stigma peltate.

TYPE LOCALITY: Sillar, Cordillera de Santa Cruz, Bolivia, altitude about 1,700 meters. Type collected by Herzog (no. 1639).

DISTRIBUTION: Known only from the type collection.

BOLIVIA: Sillar, Cordillera de Santa Cruz, *Herzog* 1639 (B, type).

I doubt if this plant, which is distinguished from *C. pubescens* by its smaller leaves and corollas, merits the specific rank assigned to it, but I hesitate definitely to reduce the species.

28. *Cavendishia cordifolia* (H. B. K.) Hoer. Bot. Jahrb. Engler 42:280. 1909.

Thibaudia cordifolia H. B. K. Nov. Gen. & Sp. 3:271. 1818.

Proclesia cordifolia Klotzsch, Linnaea 24:32. 1851.

Proclesia cordata Klotzsch, Linnaea 24:33. 1851.

Chupalon cordifolium Kuntze, Rev. Gen. Pl. 2:384. 1891.

Chupalon cordatum Kuntze, Rev. Gen. Pl. 2:384. 1891.

Cavendishia cordata Hoer. Bot. Jahrb. Engler 42:280. 1909.

Shrub up to 5 meters high with elongate branches; branchlets subterete, slender, cinereous, pilose with pale spreading hairs about 0.3 mm. long; petioles subrugose, pilose as the branchlets, becoming glabrous, 2 to 5 mm. long; leaf blades coriaceous, oblong or ovate-oblong, subcordate at base, suba-

cute at apex, entire and slightly revolute at margins, 3.5 to 8 cm. long, 2 to 4 cm. broad, glabrous above or sparsely pilose with pale spreading hairs about 0.3 mm. long, glabrous beneath or minutely puberulous, 5 (rarely 7) pinnately-nerved, the secondary nerves oriented near base, with the midnerve slightly impressed above, raised beneath, the veinlets obscurely reticulate; inflorescence axillary near ends of branchlets, subfasciculate or short-racemose (rachis rarely 3 cm. long), 5 to 15 flowered, bracteate at base and enveloped when young by deciduous submembranous glabrous oblong bracts up to 2 cm. long and 1 cm. broad; pedicels subrugose, puberulous or glabrous, 5 to 10 mm. long, each subtended by a deciduous bract similar to those at base of racemes, deciduously minutely bibracteolate near base; calyx tube campanulate, about 3 mm. long and 3 mm. in diameter at anthesis, densely and usually persistently pilose with pale spreading hairs up to 0.3 mm. long; limb erecto-patent, 1 to 2 mm. long including lobes, the lobes triangular, subacute, 1 to 1.5 mm. long; corolla subcylindric, 14 to 18 mm. long, about 4 mm. in diameter, slightly contracted above, densely and regularly pilose as the calyx, the lobes triangular, subacute, about 1.5 mm. long, often reflexed; stamens subequal (long and short stamens differing by about 1 mm., with alternately unequal filaments and anthers), 13 to 17 mm. long; filaments dark castaneous, distinct or loosely coherent at base, pilose distally with pale brown hairs, about 3 mm. and 5 mm. long, respectively; anther sacs slightly granular, about 3 mm. long; tubules wide, about 8.5 mm. and 7 mm. long, respectively; stigma peltate; young fruit subspherical, up to 9 mm. in diameter, densely pilose, eventually becoming glabrous.

TYPE LOCALITY: Andes of Colombia. Type collected by Humboldt and Bonpland.

DISTRIBUTION: Andes of Venezuela, Eastern Cordillera of Colombia, and northern Ecuador, altitude 1,300 to 3,000 meters.

VENEZUELA.

MÉRIDA: Moritz 1348 (B, type of *C. cordata*, G, K). Páramo La Trampa, Jahn 997 (N, Y). Between Tabay and Mucurubá, Pittier 12874 (Y). Mucurubá, Gehriger 275 (N, Y).

COLOMBIA: Humboldt & Bonpland (B, type); "Lobb 224" (K).

NORTE DE SANTANDER: San Pedro, between Ocaña and Pamplona, Kalbreyer 1027 (B).

SANTANDER: Charta, Killip & Smith 18875 (N, Y), 21218 (N).

CUNDINAMARCA: Vicinity of Bogotá, Triana (K), 2677 (Y); Linden 1304 (K, N); Holton 630 (G, Y); Dawe 338 (K); Tracey 14 (K); Stuebel 120b (B); Popenoe 1170 (N); Schultze 15 (B, N); Niemeyer 141a (N), 143 (N). Southeast of Quetamé, Pennell 1769 (N, Y), 1770 (G, N, Y), 1782 (Y). Tequendama, Pennell 1968 (Y). Sibaté, Pennell 2447 (N, Y).

HUILA: East of Neiva, Rusby & Pennell 567 (N, Y), 567A (Y, in part), 989 (Y), 991 (G, N, Y).

NARIÑO: Altaquer, André 3475 (K).

COLOMBIA OR ECUADOR: San Miguel, André 828 (K).

ECUADOR.

PICHINCHA: Calacall, Lehmann 6299 (B). Páramo de Chimbalan, André 3002 (K).

Among the above-cited specimens, those which show the greatest deviation from the type are the Rusby and Pennell collections from Huila, which have somewhat larger and caudate-acuminate leaves (sparsely soft-pilose beneath)

and pilose petioles and branchlets. These differences are possibly of varietal value.

Local names for *C. cordifolia* are: "Uva camarona," "uva de anis" (Bogotá), "coral" (Venezuela).

The five species considered in this section of the key (nos. 28 to 32) are of doubtful value. Since the names already exist, however, and since the slight and rather unsatisfactory differences mentioned in the key are correlated with geographic distribution, the specific names are retained in this treatment. The situation existing in this group is not uncommon in the study of most South American genera. Whether the five forms are to be considered species, varieties, slight and unstable variations, or individual forms, is purely a matter of personal opinion and experience. The possibility of some of these specimens being hybrids is not to be overlooked. Personally, I am inclined not to believe these forms of specific rank, but previous workers have demonstrated different opinions and the resulting names have in some cases become well known. For instance, to reduce the name *C. cordifolia* (the well-known form of the Bogotá region) to *C. bracteata* (the oldest of these names) would cause some confusion. This previous establishment of names and the facts of geographic distribution are my only important reasons for retaining the five species.

29. *Cavendishia hartwegiana* (Klotzsch) Hoer. Bot. Jahrb. Engler 42:281. 1909.

Proclesia hartwegiana Klotzsch, Linnaea 24:35. 1851.

Chupalon hartwegianum Kuntze, Rev. Gen. Pl. 2:384. 1891.

Shrub; branchlets subterete, when young laxly pale-pilose with hairs about 0.2 mm. long; petioles rugose, sparsely pilose or glabrous, 2 to 3 mm. long; leaf blades ovate or oblong-ovate, 3 to 5 cm. long, 1.5 to 2.2 cm. broad, broadly cuneate or truncate at base, subacute or obtusely short-acuminate at apex, entire at margins, essentially glabrous above, glabrous beneath or sparsely pilose with scattered minute brown hairs, obscurely 5-pleined, the secondary nerves oriented near base, nearly plane above, slightly raised beneath, the veinlets obscurely reticulate; inflorescence axillary or subterminal, racemose, 6 to 12 flowered, bracteate at base with a few papyraceous glabrous oblong bracts up to 20 mm. long and 8 mm. broad; rachis terete, glabrous, up to 6 cm. long; pedicels rugose, glabrous, 4 to 8 mm. long, each subtended by a deciduous bract similar to those at base of inflorescence, bibracteolate near base with linear, subcoriaceous, sparsely glandular-margined bractlets about 2 mm. long; calyx tube broadly campanulate, about 2 mm. long and 3 mm. in diameter at anthesis, laxly white-pubescent with hairs about 0.3 mm. long; limb subspreading, essentially glabrous, about 2 mm. long including lobes, the lobes triangular, acute, about 1 mm. long, thick-margined towards apex, the sinuses rounded; corolla cylindric, glabrous, 16 to 17 mm. long, about 4 mm. in diameter, the lobes triangular, acute, about 1.5 mm. long; stamens 13 to 14 mm. long; filaments castaneous, loosely connate at base, sparsely puberulous distally, about 2 mm. and 3 mm. long, respectively; anther sacs slightly granular, sparsely puberulous, about 4 mm. long; tubules wide, about 8.5 mm. and 7.5 mm. long, respectively, opening by clefts about one-third their length; stigma truncate.

TYPE LOCALITY: Loja, Province of Loja, Ecuador. Type collected by Hartweg (no. 789).

DISTRIBUTION: Andes of Ecuador.

ECUADOR: Spruce 5095 (G, K, Y); Jameson (N, Y); Seemann (G).

TUNGURAGUA: Baños, Pachano 223 (N); Tate 629 (N).

LOJA: Loja, Hartweg 789 (B, type, K, Y); Popenoe 1315 (N).

The relationship of this species to the preceding is indicated in the key and is discussed under *C. cordifolia*. Local names for *C. hartwegiana* are: "Salapa," "sagalita."

30. *Cavendishia bracteata* (R. & P.) Hoer. Bot. Jahrb. Engler 42:280. 1909.
Thibaudia bracteata R. & P. Fl. Peruv. Chil. 4: pl. 388. 1802.

Proclesia bracteata Klotzsch, Linnaea 24:34. 1851.

Chupalon bracteatum Kuntze, Rev. Gen. Pl. 2:383. 1891.

Cavendishia ulbrichiana Hoer. Bot. Jahrb. Engler 42:330. 1909.

Compact branching shrub; branchlets subterete, cinerous or brownish, deciduously pilose with lax pale hairs; petioles subterete, 1 to 3 mm. long, essentially glabrous; leaf blades oblong, 3 to 4 cm. long, 1.3 to 1.8 cm. broad, truncate or lightly subcordate at base, obtusely short-acuminate at apex, entire at margins, coriaceous, glabrous and scabridous above, glabrous or minutely brown-pilose beneath, 3-nerved from base (rarely 5-nerved), the nerves plane above, slightly raised beneath, the veinlets obscure; inflorescence axillary, subfasciculate, 3 to 8 flowered, bracteate at base and enveloped when young by several imbricate submembranous glabrous oblong bracts up to 12 mm. long and 8 mm. broad; pedicels subterete, glabrous, 3 to 4 mm. long, each bracteate at base and deciduously bibracteolate at middle; calyx coriaceous, deciduously pilose with minute appressed brown hairs, the tube campanulate, 2 to 3 mm. long, about 3 mm. in diameter at anthesis; limb erecto-patent, 1 to 1.5 mm. long including lobes, the lobes deltoid, about 1 mm. long, glandular-margined; corolla thin-carnose, cylindric, 12 to 15 mm. long, 2.5 to 3 mm. in diameter, densely white-pilose, the hairs pale, spreading, about 0.5 mm. long, eventually deciduous; stamens 12 to 13 mm. long; filaments dark castaneous, distinct, essentially glabrous, about 2 mm. and 4 mm. long, respectively; anther sacs slightly granular, about 3 mm. long; tubules wide, flexible, about 8 mm. and 6 mm. long, respectively; stigma peltate.

TYPE LOCALITY: Andes of Peru. Type collected by Dombey.

DISTRIBUTION: Andes of Central Peru.

PERU.

JUNÍN: Huasa-Huasi, *Dombey* (B, probably type collection). Between Palca and Huacapistana, 2,200 to 2,600 meters, *Weberbauer* 1770 (B, type of *C. ulbrichiana*).

The two types above cited come almost from the same locality and show no essential differences. The species is very closely related to *C. hartwegiana*.

31. *Cavendishia scabriuscula* (H. B. K.) Hoer. Bot. Jahrb. Engler 42:281. 1909.

Thibaudia scabriuscula H. B. K. Nov. Gen. & Sp. 3:272. 1818.

Proclesia scabriuscula Klotzsch, Linnaea 24:33. 1851.

Chupalon scabriusculum Kuntze, Rev. Gen. Pl. 2:384. 1891.

Low shrub with elongate branches; branchlets subterete, brownish, puberulous with short pale spreading hairs, becoming glabrous; petioles subrugose, deciduously puberulous, 3 to 4 mm. long; leaf blades oblong or oblong-lanceolate, 4 to 7 cm. long, 1.5 to 2.5 cm. broad, truncate or lightly subcordate at base, obtuse or obtusely short-acuminate at apex, entire at margins, coriaceous, usually scabridous on both surfaces, glabrous above, subglabrous beneath (frequently sparsely brown-pilose and white-puberulous on nerves), 5-plexi-nerved, the secondary nerves oriented near base, ascending, with the midnerve plane or slightly impressed above, raised beneath, the veinlets reticulate, obscure or plane on both surfaces; inflorescence axillary, subfasciculate or short-racemose (rachis rarely exceeding 2 cm. in length), 3 to 8 flowered, bracteate

at base and enveloped when young by several imbricate membranous glabrous oblong bracts up to 2 cm. long and 1 cm. broad; pedicels subterete, essentially glabrous, 5 to 8 mm. long, each bracteate at base and minutely deciduously bibracteolate; calyx pilose (usually persistently) with spreading white hairs up to 0.5 mm. long, the tube campanulate, about 2 mm. long and 3 mm. in diameter at anthesis, the limb erecto-patent, submembranous, 1.5 to 2 mm. long including lobes, the lobes deltoid, membranous-margined, about 1 mm. long; corolla membranous, cylindric, 12 to 18 mm. long, 3 to 4 mm. in diameter, pilose as the calyx; stamens 14 to 16 mm. long; filaments castaneous, membranous, distinct or loosely coherent at base, sparsely pilose distally within, about 3 mm. and 5 mm. long, respectively; anther sacs slightly granular, 3 to 4 mm. long; tubules flexible, 8 to 12 mm. and 7 to 10 mm. long, respectively; stigma truncate or subpeltate.

TYPE LOCALITY: Andes of the Quindío Region, Department of Tolima, Colombia, altitude about 3,000 meters. Type collected by Humboldt and Bonpland.

DISTRIBUTION: Eastern and Central Cordilleras of Colombia, altitude 2,000 to 3,500 meters.

COLOMBIA.

MAGDALENA: Santa Marta, *Purdie* (K). San Sebastián, *Funck* 487 (K).

NORTE DE SANTANDER: Pamplona, *Killip & Smith* 19781 (N, Y). Páramo del Hatco, *Killip & Smith* 20731 (N, Y).

SANTANDER: Las Vegas, *Killip & Smith* 15803 (N, Y), 16100 (N, Y).

Páramo Rico, *Killip & Smith* 17857 (N, Y). Quebrada del País, north of La Baja, *Killip & Smith* 18784 (N, Y). Charta, *Killip & Smith* 18888 (N, Y), 19312 (N, Y).

TOLIMA: *Goudot* (K). Quindío Trail, *Killip & Hazen* 12144 (N).

CALDAS: Salento, *Pennell* 8862 (G, N, Y); *Pennell & Hazen* 10115 (N, Y). Cerro Tatamá, *Pennell* 10539 (Y).

The differences between this species and the following are neither very marked nor constant, but the geographic isolation of the two from one another seems to indicate a different ancestry.

32. *Cavendishia beckmanniana* Hoer. Bot. Jahrb. Engler 42: 329. 1909.

Slender shrub with elongate branches; branchlets subterete, brownish, subglabrous; petioles subrugose, terete, puberulous or glabrous, 3 to 4 mm. long; leaf blades oblong, 5 to 9 cm. long, 1.8 to 3 cm. broad, truncate or lightly subcordate at base, obtuse or obtusely acuminate at apex, entire and slightly revolute at margins, usually smooth on both surfaces, glabrous on both surfaces or sparsely pilose beneath, 5-nerved from base or 5-plexi-nerved, the primary nerves slightly impressed above, raised beneath, the veinlets obscure or plane on both surfaces; inflorescence axillary, short-racemose (mature rachis 1 to 2 cm. long), 5 to 10 flowered, bracteate at base and enveloped when young by several imbricate membranous glabrous oblong bracts up to 2 cm. long and 1 cm. broad; pedicels striate, glabrous, 3 to 10 mm. long, deciduously bracteate at base and bibracteolate near base; calyx subrugose, sparsely and deciduously pilose with short spreading white hairs, the tube campanulate, 2 to 3 mm. long, about 3 mm. in diameter at anthesis, the limb erecto-patent, about 2 mm. long including lobes, the lobes deltoid, about 1.5 mm. long, membranous at margins; corolla submembranous, pilose with spreading white hairs up to 0.4 mm. long, 14 to 16 mm. long, 4 to 5 mm. in diameter; stamens 13 to 15 mm. long; filaments dark castaneous, distinct, glabrous or slightly puberulous, 2 to 3 mm. and 4 to 5 mm. long, respectively; anther sacs nearly smooth, about 3 mm. long; tubules flexible, about 10 mm. and 8 mm. long, respectively; stigma subpeltate; young fruit subspherical, soon glabrous, up to 8 mm. in diameter.

TYPE LOCALITY: Sandía, Department of Cuzco, Peru, altitude 2,300 to 2,400 meters. Type collected by Weberbauer (no. 636).

DISTRIBUTION: Andes of central Peru to northern Bolivia, altitude 1,000 to 3,000 meters.

PERU: Tabina, *Lechler* 1875 (K). San Gován, *Lechler* 2198 (K).

JUNÍN: Huacapistana, *Killip & Smith* 24269 (N, Y).

AYACUCHO: Ccarrapa, between Huanta and Río Apurímac, *Killip & Smith* 22297 (N, Y), 22387 (N, Y), 22489 (N, Y), 23209 (N, Y). Aina, between Huanta and Río Apurímac, *Killip & Smith* 23141 (N, Y).

CUZCO: Sandía, *Weberbauer* 636 (B, type). Between Torontoy and Machu Picchu, *Cook & Gilbert* 833 (N). Urubamba Valley, *Cook & Gilbert* 879 (N); *Herrera* 1562 (N).

BOLIVIA.

LA PAZ: Unduavi, *Buchtien* 2981 (B, N, Y).

COCHABAMBA: Incachaca, *Steinbach* 8860 (Y).

Local names in southern Peru are: "Boton-boton," "maycha."

33. *Cavendishia montana* A. C. Smith, sp. nov.

Frutex; laminis oblongo-ovatis basi late cuneatis apice subacutis 5 ad 7 pli-nervis; inflorescentia breviter racemosa basi bracteis papyraceis oblongis fimbriatis instructa; calycis rugosi subprismatici limbo quam tubo brevior, lobis apiculatis; corolla subcylindrica laxe albo-pilosa; staminibus alternatim leviter inaequalibus, filamentis pilosis, tubulis quam loculis duplo longioribus.

Shrub; branchlets rugose or subterete, pubescent when young with pale lax hairs about 0.4 mm. long, becoming glabrous and cinereous; petioles subrugose, narrowly angled, sparsely pilose or glabrous, 6 to 8 mm. long; leaf blades oblong-ovate, 6 to 10 cm. long, 3 to 4.5 cm. broad, broadly cuneate at base, subacute or short-acuminate at apex, entire at margins, glabrous or short-pilose on nerves on both surfaces, 5 to 7 pli-nerved, the secondary nerves oriented near base, ascending, with the midnerve slightly impressed above, raised beneath, the veinlets nearly plane on both surfaces; inflorescence axillary, short-racemose, 4 to 10 flowered, bracteate at base and partly enveloped by several imbricate papyraceous oblong fimbriate bracts up to 2 cm. long and 1.2 cm. broad; pedicels subrugose, glabrous or sparsely puberulous when young, 4 to 6 mm. long, each subtended by a deciduous bract similar to those at base of inflorescence, deciduously bibracteolate near base with oblong-lanceolate bractlets about 2 mm. long; calyx tube rugose, campanulate, narrowly and bluntly winged to sinuses, glabrous (or sparsely pubescent when young), about 3 mm. long and 4 mm. in diameter at anthesis; limb erecto-patent, 2 to 2.5 mm. long including lobes, the lobes apiculate, less than 1 mm. long, sparsely pilose at margins; corolla subcylindric, 17 to 18 mm. long, 5 to 6 mm. in diameter, contracted distally, laxly white-pubescent with hairs about 0.4 mm. long, the lobes triangular, subacute, about 1.5 mm. long; stamens 13 to 14 mm. long; filaments dark castaneous, distinct or loosely coherent, densely pilose ventrally and at margins distally with spreading brown hairs about 0.4 mm. long, 2 mm. and 4 mm. long respectively; anther sacs slightly granular, 3 to 4 mm. long; tubules wide, flexible, about 8 mm. and 7 mm. long respectively; style stout, slightly exerted in mature flowers, the stigma peltate.

Type in the U. S. National Herbarium, no. 1,143,663, collected in forest at Pinares, above Salento, Department of Caldas, Central Cordillera, Colombia, altitude 2,600 to 2,800 meters, August 2 to 10, 1922, by F. W. Pennell (no. 9305). Duplicates at B, G, Y.

DISTRIBUTION: Central Cordillera of Colombia, altitude 2,600 to 3,500 meters.

COLOMBIA.

TOLIMA: La Ceja, Quindío Trail, Killip & Hazen 9520 (N, Y).

CALDAS: Magaña, Quindío Trail, Killip & Hazen 9170 (N, Y).

The present species is set off from the preceding complex (*C. cordifolia* and relatives) by its minute calyx lobes, short pedicels, and compact inflorescences.

34. *Cavendishia durifolia* A. C. Smith, sp. nov.

Frutex robustus; laminis crasso-coriaceis oblongis vel deltoideo-oblongis basi truncatis apice acuminatis 5 ad 7 pli-nerviis; inflorescentia subfasciculata basi bracteis imbricatis oblongo-ovatis parce puberulis instructa; calycis tubo elongato-campanulato saepe falcato, limbo breve; corolla subcylindrica dense pubescente; staminibus alternatim leviter inaequalibus; tubulis quam loculis longioribus.

Shrub; branchlets stout, subterete, glabrous, brownish; petioles slightly rugose, 7 to 9 mm. long, glabrous; leaf blades thick-coriaceous, glabrous, oblong or deltoid-oblong, 9 to 14 cm. long, 3.5 to 4.5 cm. broad (broadest towards base), truncate at base, acuminate at apex, entire and slightly revolute at margins, 5 to 7 pli-nerved, the secondary nerves oriented near base, with the midnerve shallowly impressed above, prominent beneath, the veinlets reticulate, plane above, slightly raised beneath; inflorescence axillary, subfasciculate (peduncle stout, not more than 5 mm. long), 4 to 10 flowered, bracteate at base and enveloped when young by numerous imbricate, submembranous, oblong-ovate, sparsely puberulous bracts up to 2.5 cm. long and 1.5 cm. broad; pedicels subterete, glabrous or puberulous, 4 to 6 mm. long, each subtended by a bract similar to those at base of inflorescence, deciduously bibracteolate near base; calyx tube elongate-campanulate, usually strongly falcate, glabrous, nigrescent, 6 to 7 mm. long, 4 to 4.5 mm. in diameter at anthesis; limb suberect, about 3 mm. long, including lobes, the lobes triangular, acute, glabrous or sparsely puberulous, about 2 mm. long, the sinuses rounded; corolla subcylindric, 20 to 24 mm. long, about 5 mm. in diameter, densely pubescent with pale spreading hairs about 0.5 mm. long, the lobes oblong, subacute, about 2 mm. long; stamens about 15 mm. and 16 mm. long, respectively; filaments nigrescent, marginally and ventrally pilose with hairs about 0.3 mm. long, 3 mm. and 5.5 mm. long, respectively; anther sacs slightly granular, 4 to 5 mm. long; tubules flexible, about 9 mm. and 8 mm. long, respectively; stigma peltate; young fruit sub-spherical, coriaceous, glabrous, up to 1 cm. in diameter.

Type in the herbarium of the New York Botanical Garden, collected in forest at Murillo, Department of Tolima, Colombia, altitude 2,100 to 2,500 meters, December 18, 1917, by F. W. Pennell (no. 3178).

DISTRIBUTION: Known only from the type specimen.

Distinguished by very short pedicels and a peculiarly elongate calyx tube. The leaves, which are rigidly coriaceous and are broadest near the base, are also characteristic.

35. *Cavendishia axillaris* A. C. Smith, sp. nov.

Frutex; laminis subsessilibus oblongis vel oblongo-rotundatis basi leviter subcordatis apice breviter acuminatis pinnatinerviis; inflorescentia breviter racemosa basi bracteis subcoriaceis ovatis decidue fimbriatis instructa ubique glabra; floribus subsessilibus; calycis campanulati tubo quam limbo longiore; corolla coriacea subcylindrica; filamentis antherisque compensanter inaequalibus, filamentis distinctis glabris.

Shrub, branchlets subterete or striate, glabrous, brownish; petioles subterete, glabrous, 4 mm. long or less; leaf blades appearing sessile, oblong or oblong-rotund, 10 to 13 cm. long, 6 to 8.5 cm. broad, lightly subcordate at base, short-acuminate at apex, entire and slightly revolute at margins, glabrous, pinnate-

veined, the midvein slightly raised above, prominent beneath, the secondary veins 4 to a side, spreading, arcuate near margins, plane or slightly impressed above, prominent beneath, the veinlets reticulate, slightly raised above, plane beneath; inflorescence axillary, short-racemose (rachis usually less than 1 cm. long), 5 to 10 flowered, circumscribed at base and partially enveloped by several subcoriaceous, ovate, deciduously fimbriate bracts up to 7 mm. long and 5 mm. broad, essentially glabrous in all parts; flowers subsessile, the pedicels 1 mm. long or less, each subtended by a bract similar to those at base of inflorescence and partially covering the flower individually; calyx coriaceous, the tube short-cylindric or campanulate, about 3 mm. long and 3 mm. in diameter at anthesis, the limb erect, about 2 mm. long including lobes, the lobes triangular, acute, about 1 mm. long; corolla immature in our specimen, coriaceous, subcylindric or subspherical, about 5 mm. long and 3 mm. in diameter; stamens about 4.8 mm. long; filaments nigrescent, distinct, carnose, glabrous, about 1 mm. and 2 mm. long, respectively; anther sacs slightly granular, about 3.5 mm. and 3 mm. long, respectively; tubules (immature) about 1 mm. long, opening by clefts nearly as long; stigma peltate.

Type in the herbarium of the New York Botanical Garden, collected in forest above Cascada Chorrón, south of Antizales, Department of Bolívar, Colombia, altitude 2,300 to 2,700 meters, February 25, 1918, by F. W. Pennell (no. 4375).

DISTRIBUTION: Known only from the type collection.

A very distinct species of dubious relationship, marked by its crowded few-flowered inflorescences, small flowers, and broad subsessile leaves.

36. *Cavendishia guatapeensis* Mansf. Notizbl. Bot. Gart. Berlin 9:440. 1925.

Low shrub; branchlets subterete, glabrous, with a loose cinereous bark; petioles subterete, glabrous, 2 to 3 mm. long; leaf blades oblong or oblong-ovate, 3 to 5 cm. long, 1.5 to 2.3 cm. broad, truncate or lightly subcordate at base, subacute or obtusely acuminate at apex, entire at margins, glabrous, sometimes sparsely pilose beneath when young with minute appressed brownish hairs about 0.1 mm. long, 5-plex-nerved, the secondary nerves oriented near base, with the midnerve slightly impressed above, raised beneath, the veinlets obscurely reticulate; inflorescence axillary, subfasciculate or short-racemose (rachis rarely more than 1 cm. long), 8 to 15 flowered, bracteate at base and enveloped when young by several papyraceous oblong bracts about 10 mm. long and 6 mm. broad, essentially glabrous in all parts; pedicels up to 3 mm. long (flowers often appearing sessile), each subtended by a bract similar to those at base of racemes, bibracteolate at base with papyraceous oblong acute bractlets up to 8 mm. long, the bractlets sometimes covering the calyx; calyx tube short-cylindric, about 2 mm. long and 2.5 mm. in diameter at anthesis; limb suberect, about 2.5 mm. long including lobes, the lobes ovate, apiculate, about 1 mm. long, thick-margined except at apex; corolla subcylindric, 8 to 9 mm. long, 3 to 4 mm. in diameter, dark red, paler at lobes, glabrous or rarely short-pubescent with scattered appressed brownish hairs, the lobes triangular, subacute, about 1 mm. long; stamens about 6.5 mm. and 7.5 mm. long, respectively; filaments castaneous, distinct, marginally pilose with hairs up to 0.2 mm. long or subglabrous, 2 mm. and 3.5 mm. long, respectively; anther sacs slightly granular, 2.5 to 3 mm. long; tubules wide, about 3 mm. and 2 mm. long, respectively; stigma truncate.

TYPE LOCALITY: Río Guatapé, between Medellín and Nare, Department of Antioquia, Colombia, altitude about 2,300 meters. Type collected by Kalbreyer (no. 1468).

DISTRIBUTION: Western and Central Cordilleras of northern Colombia, altitude 2,000 to 3,100 meters.

COLOMBIA.

BOLÍVAR: Below Páramo de Chaquiro, Western Cordillera, *Pennell* 4300 (Y), 4307 (Y), 4332 (G, N, Y).

ANTIOQUÍA: Río Guatapé, between Medellín and Nare, *Kalbreyer* 1468 (B, type, K). Santa Rosa, *Lehmann* 7527 (K). Medellín, *Toro* 468 (Y). Santa Elena, *Archer* 1289a (N, Y).

TOLIMA: Murillo, *Pennell* 3193 (Y).

Distinguished not only by its small blunt leaves, but also by its very short pedicels and its large bractlets, these sometimes covering the calyces.

37. *Cavendishia quereme* (H. B. K.) Benth. & Hook. Gen. Pl. 2:570. 1876.

Thibaudia quereme H. B. K. Nov. Gen. & Sp. 3:274. 1818.

Polyboea quereme Klotzsch, Linnaea 24:31. 1851.

Ceratostema odoratissimum Willd.; Klotzsch, Linnaea 24:31. 1851, as synonym.

Chupalon quereme Kuntze, Rev. Gen. Pl. 2:384. 1891.

Orthaea lehmannii Fedtsch. & Basil. Not. Syst. Herb. Hort. Bot. U. S. S. R. 6:24. 1926.

Low epiphytic shrub about 1 meter high; branchlets subterete, brownish, glabrous; petioles terete, slightly rugose, 3 to 7 mm. long, glabrous; leaf blades oblong-ovate, 6 to 12 cm. long, 1.5 to 4 cm. broad, cuneate at base, caudate-acuminate at apex, entire and slightly revolute at margins, glabrous, 5-plex-nerved, the secondary nerves oriented near base, ascending, with the mid-nerve deeply impressed above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces or plane; inflorescence terminal and axillary, racemose, essentially glabrous in all parts, 10 to 20 flowered; rachis angled, 2 to 5 cm. long; pedicels subrugose, 8 to 12 mm. long, each subtended by an oblong acute membranous bract up to 2 cm. long, deciduously bibracteolate at base with bractlets up to 1 mm. long, swollen at apex; calyx tube short-cylindric, 1 to 1.5 mm. long and 3 to 4 mm. in diameter at anthesis; limb sub-erect, 2 to 2.5 mm. long including lobes, the lobes ovate, apiculate, about 1.5 mm. long, thin-margined and rarely sparsely glandular-margined; corolla sub-cylindric, 9 to 10 mm. long, about 4 mm. in diameter at base, contracted above, the lobes triangular, subacute, about 1 mm. long; stamens 7.5 mm. and 8.5 mm. long, respectively; filaments castaneous, distinct, glabrous, about 1.5 mm. and 3.5 mm. long, respectively; anther sacs nearly smooth, 2 to 2.5 mm. long; tubules wide, about 5 mm. and 3.5 mm. long, respectively; stigma truncate.

TYPE LOCALITY: Near Cali, Department of El Valle, Colombia, altitude about 1,000 meters. Type collected by Humboldt and Bonpland.

DISTRIBUTION: Western Cordillera of Colombia and mountains of Costa Rica, altitude 1,000 to 1,700 meters.

COLOMBIA.²⁹

EL VALLE: Near Cali, *Humboldt & Bonpland* (B, type collection); *Merck* (?) (B). Upper Río Dagua, *Lehmann* 2954 (type collection of *Orthaea lehmannii*, B, N). Valle del Salado, *Triana* 2671 (K, N, Y).

EL CAUCA: Popayán, in cultivation, *Hartweg* 1221 (K); *Stuebel* 317a (B). Between Popayán and Alto del Cauca, *Stuebel* 340a (B).

This species, which appears to be locally common in the Western Cordillera of Colombia and again in Costa Rica, is well marked by its bullate leaves and by the characters mentioned in the key. A local name in the Cali region is "quereme."

²⁹ For Costa Rican specimens see page 457.

38. *Cavendishia caudata* A. C. Smith, sp. nov.

Frutex; laminis oblongo-ovatis basi rotundatis vel late cuneatis apice longe acuminatis glabris 5-pli-nerviis; inflorescentia subfasciculata basi decidue bracteata; pedicellis brevibus bibracteolatis, bracteolis papyraceis oblongis venosis; floribus subglabris; calycis campanulati limbo tubum subaequante; corolla subcylindrica; staminibus alternatim leviter inaequalibus, filamentis parce pilosis, tubulis loculos subaequantibus.

Shrub; branchlets subterete, brownish, minutely puberulous; petioles subterete, slender, puberulous, 2 to 4 mm. long; leaf blades oblong-ovate, 10 to 13 cm. long, 3 to 4 cm. broad, rounded or broadly cuneate at base, long-acuminate at apex (acumen 2 to 3 cm. long), entire and slightly revolute at margins, glabrous, 5-pli-nerved, the secondary nerves oriented slightly above base, with the midnerve slightly impressed above, raised beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary or terminal, subfasciculate, deciduously bracteate at base; pedicels subterete, about 2 mm. long, glabrous, subtended by bracts (?), bibracteolate at middle (bractlets papyraceous, oblong, about 8 mm. long and 4 mm. broad, sparsely fimbriate, coarse-veined, completely covering the calyx), obscurely articulate with calyx; calyx tube campanulate, essentially glabrous, about 2 mm. long and 3 mm. in diameter at anthesis; limb suberect, about 3 mm. long including lobes, the lobes ovate, apiculate, about 1.5 mm. long, the sinuses sharp; corolla subcylindric, 7 to 10 mm. long, 3 to 4 mm. in diameter, contracted distally, glabrous; stamens imperfect in our specimen but apparently subequal, 5 to 6 mm. long; filaments castaneous, pilose ventrally and at margins distally with short pale hairs, about 1.5 mm. and 3 mm. long, respectively; anther sacs slightly granular, about 2 mm. long; tubules about 2.5 mm. and 1.5 mm. long; stigma peltate.

Type in the herbarium of the New York Botanical Garden, collected in forest at Antizales, Department of Bolívar, Colombia, altitude 1,700 to 2,000 meters, February 25 or 26, 1918, by F. W. Pennell (no. 4441).

DISTRIBUTION: Known only from the type collection.

A very unusual species, of which the described specimen is somewhat incomplete. However, the short pedicels with large bracts which cover the calyces, together with the long-acuminate leaves and slender petioles, serve to distinguish it from its allies.

39. *Cavendishia oligantha* A. C. Smith, sp. nov.

Frutex; laminis oblongo-ovatis subbullatis basi cuneatis vel subattenuatis apice longe acuminatis 5 ad 7 pli-nerviis; inflorescentia laxe et breviter racemosa decidue bracteata ubique glabra; calycis campanulati limbo quam tubo paullo longiore, lobis brevibus; corolla subcylindrica; filamentis antherisque compensanter inaequalibus, tubulis quam loculis duplo longioribus.

Shrub; branchlets rugose, slender, glabrous; petioles subrugose, glabrous, 5 to 7 mm. long; leaf blades oblong-ovate, 9 to 11 cm. long, 3 to 4 cm. broad, somewhat bullate, cuneate or subattenuate at base, long-acuminate at apex, entire and slightly revolute at margins, glabrous, nitid, 5 to 7 pli-nerved, the secondary nerves oriented above base, sharply ascending, with the midnerve impressed above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary, laxly short-racemose, 3 to 6 flowered, deciduously bracteate (bracts not present in our specimen), essentially glabrous; rachis subterete, slender, flexuose, about 1 cm. long; pedicels subterete, 3 to 6 mm. long, the bractlets small, deciduous; calyx tube short-cylindric or campanulate, rugose, bluntly angled to sinuses, about 1.5 mm. long and 1.5 mm. in

diameter at anthesis; limb erect, 2 to 3 mm. long including lobes, the lobes triangular, acute, about 1 mm. long, membranous-margined and sparsely fimbriate with minute glandular hairs; corolla subcylindric, 8 to 9 mm. long, about 3.5 mm. in diameter, the lobes reflexed at maturity, triangular, obtuse, about 1 mm. long; stamens subequal (alternate filaments and anthers compensatingly unequal), 6.5 to 7 mm. long; filaments nigrescent, slender, distinct, marginally pilose or glabrous, about 1.5 mm. and 2.5 mm. long, respectively; anther sacs nearly smooth, about 1.5 mm. long; tubules flexible, about 4 mm. and 3 mm. long, respectively, opening by clefts about half as long; stigma truncate.

Type in the herbarium of the New York Botanical Garden, collected near Tuquerres, Department of Nariño, Colombia, altitude 2,700 meters, 1851 to 1857, by J. Triana (no. 2675). Duplicate at K.

DISTRIBUTION: Known only from the type collection.

From the preceding species this plant is distinguished by the smaller bractlets, the small calyx lobes, and the leaves being more attenuate at base.

40. *Cavendishia glandulosa* A. C. Smith, sp. nov.

Frutex epiphyticus; ramulis gracilibus pendulis setosis; laminis lanceolato-oblongis basi rotundatis vel truncatis apice acuminatis utrinque pilosis obscure 5-pli-nerviis; inflorescentia subfasciculata vel breviter racemosa basi bracteata; calyce parce puberulo et dense glanduloso (glandulis castaneis globosis sessilibus), limbo tubum subaequante; corolla subcylindrica glabra; staminibus alternatim leviter inaequalibus, filamentis connatis, tubulis quam loculis paullo longioribus.

Epiphytic shrub with pendent branches; branchlets rugose, slender, lax, brownish, densely pubescent with pale brown setiform hairs about 0.8 mm. long; petioles rugose, pubescent as the branchlets, about 1 mm. long; leaf blades lanceolate-oblong, 35 to 45 mm. long, 10 to 16 mm. broad, rounded or truncate at base, acuminate at apex, entire at margins, pilose on both surfaces (more sparsely so above) with pale stiff hairs about 0.6 mm. long (hairs not more than five per square millimeter except on veins), obscurely 5-pli-nerved, the midnerve slightly impressed above, raised beneath, the secondary nerves ascending from base, slightly raised on both surfaces, the veinlets reticulate, plane on both surfaces; inflorescence terminal or axillary, subfasciculate or short-racemose (rachis up to 2 cm. long, stout, setose), 5 to 10 flowered, bracteate at base and partly enveloped by several imbricate submembranous oblong-obovate puberulous bracts about 15 mm. long and 8 mm. broad; pedicels subrugose, sparsely pilose distally with spreading hairs about 0.3 mm. long, 3 to 5 mm. long, each subtended by a deciduous bract similar to those at base of inflorescence, obscurely articulate with calyx; calyx coriaceous, sparsely puberulous as the pedicel and also densely covered with minute castaneous spherical sessile glands (glands about 0.1 mm. in diameter, densely covering the surface of the calyx tube), the tube campanulate, about 3.5 mm. long and 3.5 mm. in diameter at anthesis, the limb suberect, about 4 mm. long including lobes, the lobes triangular, subacute, 1.5 to 2 mm. long, the sinuses rounded; corolla "white," subcylindric, 12 to 14 mm. long, 6 mm. in diameter, slightly contracted at base and apex, glabrous, the lobes triangular, subacute, reflexed at maturity, about 1.5 mm. long; stamens about 7 mm. and 8 mm. long, respectively; filaments castaneous, glabrous or sparsely puberulous distally, about 3.5 mm. and 4 mm. long, respectively, firmly connate in a tube about 3 mm. long; anther sacs nearly smooth, 1.5 to 2 mm. long; tubules flexible, about 3 mm. and 2 mm. long, respectively; stigma truncate.

Type in the herbarium of the New York Botanical Garden, collected in shrub zone below Páramo de Chaquiro, Western Cordillera, Department of Bolívar, Colombia, altitude 2,800 to 3,100 meters, February 24, 1918, by F. W. Pennell (no. 4301).

DISTRIBUTION: Known only from the type specimen.

This plant, which is without close relatives, is one of the most remarkable species known from the extraordinarily rich region of northern Colombia. It is unique in the possession of a densely gland-covered calyx and in its firmly connate filaments.

41. *Cavendishia angustifolia* Mansf. Notizbl. Bot. Gart. Berlin 9: 439. 1925.

Compact branching shrub; branchlets subterete, brownish, minutely puberulous or glabrous; petioles subrugose, subglabrous, about 2 mm. long; leaf blades lanceolate, 3.5 to 6.5 cm. long, 0.6 to 1 cm. broad, truncate at base, obtusely short-acuminate at apex, entire at margins, subcoriaceous, glabrous on both surfaces, 3-plexi-nerved, the secondary nerves oriented about 5 mm. above base, sharply ascending, with the midnerve impressed above, prominent beneath, the veinlets slightly impressed above, obscure beneath; inflorescence axillary, subfasciculate or short-racemose (rachis up to 1 cm. long), 8 to 12 flowered, glabrous in all parts, bracteate at base and enveloped by numerous imbricate papyraceous oblong bracts up to 18 mm. long and 8 mm. broad; pedicels subterete, slender, 3 to 5 mm. long, each bracteate at base; calyx tube coriaceous, short-cylindric or subprismatic, about 2 mm. long and 2 mm. in diameter at anthesis; limb suberect, subcoriaceous, about 2 mm. long including lobes, the lobes triangular, blunt, thickened, about 1 mm. long and 1.5 mm. broad, the sinuses rounded; corolla submembranous, cylindric, 12 to 13 mm. long, about 3 mm. in diameter, the lobes triangular, 1 mm. long; stamens nearly as long as corolla; filaments castaneous, distinct, sparsely pilose distally, about 1 mm. and 2.5 mm. long, respectively; anther sacs slightly granular, about 2.5 mm. long; tubules membranous, 9 mm. and 7.5 mm. long, respectively; stigma truncate or subpeltate.

TYPE LOCALITY: Carolina, Department of Antioquia, Colombia, altitude 1,850 to 2,300 meters. Type collected by Kalbreyer (no. 1624).

DISTRIBUTION: Known only from the type collection.

COLOMBIA.

ANTIOQUÍA: Carolina, *Kalbreyer* 1624 (B, type, K).

A very handsome and compact little plant, easily identified by its small lanceolate leaves.

42. *Cavendishia obtusa* A. C. Smith, sp. nov.

Frutex robustus; laminis oblongis basi truncatis vel leviter subcordatis apice rotundatis subtus punctatis et decidue pilosis 5 ad 7 pli-nerviis; inflorescentia breviter racemosa basi bracteis ovato-oblongis imbricatis instructa ubique glabra; calycis prismatici rugosi limbo tubum subaequante; corolla subcylindrica; staminibus alternatim leviter inaequalibus, tubulis quam loculis 2 ad 3-plo longioribus.

Stout shrub; branchlets subterete or angled, brownish, glabrous, up to 6 mm. in diameter near their termination; petioles subrugose, 4 to 10 mm. long, glabrous; leaf blades oblong, 10 to 22 cm. long, 3.5 to 6 cm. broad, truncate or lightly subcordate at base, rounded at apex, entire and strongly revolute at margins, glabrous and sometimes sparsely punctate above, punctate beneath and deciduously pilose with scattered appressed brownish hairs about 0.3 mm. long, 5 to 7 pli-nerved, the midnerve impressed above, very prominent beneath, the secondary nerves oriented near base, ascending, slightly impressed above,

prominent beneath, the veinlets reticulate, plane above, slightly raised beneath; inflorescence axillary near ends of branchlets, short-racemose, 10 to 30 flowered, bracteate at base and partially enveloped by numerous imbricate papyraceous ovate-oblong bracts up to 3 cm. long and 2 cm. broad, glabrous in all parts; rachis subrugose, stout, 1 to 3 cm. long; pedicels rugose, 8 to 12 mm. long, each subtended by a bract similar to those at base of inflorescence, deciduously bibracteolate near base; calyx tube strongly rugose, angled to sinuses, prismatic, 3.5 to 4 mm. long, about 4 mm. in diameter at anthesis; limb suberect, coriaceous, 4 to 5 mm. long including lobes, the lobes triangular, apiculate, about 1.5 mm. long, thick-margined except at apex; corolla subcylindric, dark red, white distally and sometimes slightly farinose at lobes, about 24 mm. long and 6 mm. in diameter, contracted distally, the lobes reflexed at maturity, triangular, subacute, about 2 mm. long; stamens 10, about 18.5 mm. and 19.5 mm. long; filaments castaneous, distinct, puberulous within distally with brownish hairs up to 0.3 mm. long, about 4 mm. and 5 mm. long, respectively; anther sacs granular, 4 to 4.5 mm. long; tubules wide, about 12.5 mm. and 11 mm. long; style exerted in mature flowers, longitudinally striate, the stigma truncate; young fruit subcylindric, strongly rugose, up to 8 mm. in diameter.

Type in the U. S. National Herbarium, no. 1,042,353, collected in thicket on slope of Mount Chuscal, west of Zipaquirá, Department of Cundinamarca, Colombia, altitude 3,000 to 3,100 meters, October 22, 1917, by F. W. Pennell (no. 2572). Duplicates at G, Y.

DISTRIBUTION: Eastern and Central Cordilleras of central Colombia, altitude 2,200 to 3,100 meters.

COLOMBIA.

CUNDINAMARCA: Tequendama, *Holton* 631 (K, Y). Between Fusagasugá and Bogotá, *Stuebel* 149a (B). Facatativá, *Tracey* 269 (K).

HUILA: East of Neiva, *Rusby & Pennell* 676 (Y).

CALDAS: Between Salento and Laguneta, Quindío Trail, *Killip & Hazen* 9104 (N, Y). Pinares, above Salento, *Pennell* 9303 (N, Y).

This robust and beautiful species is apparently common locally, but has previously escaped description. It is readily recognized by the rounded or obtuse leaves, the large and rugose calyx, and the numerous large bracts.

EXPLANATION OF PLATE 16.—*Cavendishia obtusa*, from photograph of type sheet. About one-half natural size.

43. *Cavendishia marginata* A. C. Smith, sp. nov.

Frutex; laminis oblongis vel ovato-oblongis basi cuneatis apice caudato-acuminatis 5-plex-nerviis; inflorescentia subfasciculata vel breviter racemosa, basi bracteis imbricatis papyraceis oblongis vel ovatis instructa, ubique glabra; pedicellis bibracteolatis, bracteolis linearibus glanduloso-marginatis; calycis limbo tubum subaequante, lobis elongato-triangularibus lateraliter calloso-marginatis. Corolla et stamina desunt.

Shrub; branchlets striate, stramineous, glabrous; petioles subterete, canaliculate, 4 to 6 mm. long; leaf blades oblong or ovate-oblong, 8 to 12 cm. long, 3.5 to 4 cm. broad, cuneate at base, caudate-acuminate at apex, entire and revolute at margins, glabrous, nitid, sparsely brown-punctate beneath, 5-plex-nerved, the secondary nerves oriented at base, slightly impressed above, raised beneath, the veinlets obscurely reticulate; inflorescence terminal or axillary, subfasciculate or short-racemose (rachis stout, up to 5 mm. in diameter, less than 1 cm. long), 8 to 15 flowered, bracteate at base and enveloped when young by several imbricate, papyraceous, oblong or ovate bracts up to 35 mm. long and 20 mm. broad, glabrous in all parts; pedicels rugose, 6 to 8 mm. long, each subtended by a deciduous bract similar to those at base of

inflorescence, bibracteolate at base (bractlets linear, 10 to 13 mm. long, about 1 mm. broad, glandular-margined, glands about 15 per side, spherical), slightly swollen distally; calyx coriaceous, glabrous, the tube short-cylindric, about 3.5 mm. long and 5 mm. in diameter (past maturity), the limb erect, about 3.5 mm. long including lobes, the lobes elongate-triangular, about 2.5 mm. long, acute, each flanked by a nigrescent elongate callose thickening, the sinuses rounded; corolla (?); style filiform, 30 to 35 mm. long, the stigma peltate.

Type in the herbarium of the New York Botanical Garden, collected in forest at La Gallera, Micay Valley, Western Cordillera, Department of El Cauca, Colombia, altitude 1,400 to 2,100 meters, June 29 or 30, 1922, by E. P. Killip (no. 7691).

DISTRIBUTION: Known only from the type specimen.

In spite of the absence of corolla and stamens in the type specimen, this species is marked as distinct by its extraordinary bractlets and peculiar calyx lobes. The length of the style and the robust aspect of the calyx indicate its affinity with the large-flowered group of species.

44. *Cavendishia rigidifolia* A. C. Smith, sp. nov.

Arbor parva rigida; laminis lanceolato-oblongis basi anguste subtruncatis apice longe acuminatis 5-plex-nerviis; inflorescentia fasciculata glabra bracteis numerosis papyraceis ovato-oblongis circumdata; calycis rugosi tubo campanulato, limbo quam tubo brevior; corolla cylindrica; filamentis antherisque alternatim compensanter inaequalibus, tubulis quam loculis paullo longioribus.

Small tree with stiff branches; branchlets angled or subterete, rugose, brownish, glabrous, 4 to 5 mm. in diameter near apices; petioles strongly rugose, glabrous, stout, about 3 mm. in diameter, 6 to 10 mm. long; leaf blades lanceolate-oblong, 20 to 25 cm. long, 4 to 5 cm. broad, narrowed and subtruncate at base, long-acuminate at apex, entire at margins, thick-coriaceous, glabrous on both surfaces, 5-plex-nerved, the second and third nerves oriented 1 to 2 cm. above base, ascending to apex, the fourth and fifth nerves oriented from base, the 5 primary nerves impressed above, prominent beneath, the veinlets slightly raised above, plane beneath; inflorescence axillary near ends of branchlets, fasciculate (peduncle stout, short, about 8 mm. long and broad), 10 to 20 flowered, glabrous in all parts, enveloped by numerous imbricate papyraceous ovate-oblong bracts up to 3 cm. long and 2.5 cm. broad; pedicels subterete, stout, about 3 mm. in diameter, 4 to 6 mm. long, deciduously bibracteolate near base, swollen distally; calyx thick, coriaceous, the tube campanulate, about 5 mm. long and 6 mm. in diameter at anthesis, the limb suberect, about 3 mm. long including lobes, the lobes subtriangular, 2 to 3 mm. long, sparsely glandular, the sinuses subacute; corolla thin-carnose, cylindric, about 22 mm. long, 5 to 7 mm. in diameter, the lobes triangular, about 1 mm. long; stamens about 17 mm. long; filaments castaneous, distinct, sparsely puberulous, 5 mm. and 7 mm. long, respectively; anther sacs nearly smooth, about 6 mm. long; tubules membranous, about 8 mm. and 5 mm. long, respectively; stigma truncate; young fruit campanulate, 8 to 10 mm. in diameter, surmounted by the incurved calyx lobes.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected at Las Minitas, between Medellín and Manizales, Department of Antioquia, Colombia, altitude about 2,400 meters, July, 1921, by Mrs. I. A. Tracey (no. 335).

DISTRIBUTION: Known only from the type specimen.

Readily distinguished from related species by its large lanceolate leaves.

45. *Cavendishia lehmannii* Hoer. Bot. Jahrb. Engler 42:331. 1909.

Shrub; branchlets subterete, brownish, slender, white-pilose when young with spreading hairs up to 0.5 mm. long; petioles terete, slender, pilose as the branch-

lets, 3 to 4 mm. long; leaf blades oblong or lanceolate-oblong, 8 to 10 cm. long, 2 to 3 cm. broad, broadly cuneate at base, long-acuminate at apex, entire at margins, glabrous above, pilose beneath when young, especially on nerves, with hairs about 0.3 mm. long, 5-ply-nerved, the secondary nerves oriented near base, ascending, with the midnerve slightly impressed above, prominent beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence terminal or axillary, subfasciculate or short-racemose (rachis less than 1 cm. long), 6 to 10 flowered, bracteate at base and partly enveloped by several submembranous oblong glabrous bracts up to 25 mm. long and 12 mm. broad; pedicels subterete, densely and persistently pilose with minute spreading pale hairs, 4 to 6 mm. long, each subtended by a deciduous bract similar to those at base of inflorescence, deciduously bracteolate near base with linear, subcoriaceous, sparsely fimbriate bractlets about 4 mm. long; calyx coriaceous, pilose at base as the pedicels, the tube subcylindric or campanulate, about 2 mm. long and 3 mm. in diameter at anthesis, the limb suberect, about 3.5 mm. long, including lobes, the lobes triangular, acute, about 1 mm. long, each margined with several minute irregular glands; corolla subcylindric, 18 to 20 mm. long, about 4 mm. in diameter, glabrous, the lobes triangular, subacute, about 1 mm. long; stamens subequal (alternate filaments and anthers compensatingly unequal), 15 to 16 mm. long; filaments nigrescent, minutely pilose distally or glabrous, loosely coherent at base, about 3 mm. and 6 mm. long, respectively; anther sacs granular, 3.5 to 4 mm. long; tubules erect, wide, about 10 mm. and 7 mm. long, respectively; stigma truncate.

TYPE LOCALITY: Amalfi, Department of Antioquia, Colombia, altitude 1,600 to 1,800 meters. Type collected by Lehmann (no. 7895).

DISTRIBUTION: Known only from the type locality.

COLOMBIA.

ANTIOQUIA: Amalfi, *Lehmann* 7895 (B, type, F), CCXXX (N).

This species is distinguished from its allies by the pilose pedicels and calyx tube.

46. *Cavendishia gracilis* A. C. Smith, sp. nov.

Frutex gracilis; *laminis oblongis vel ovato-oblongis basi cuneatis apice longe acuminatis obscure 5-ply-nerviis*; *inflorescentia breviter racemosa glabra basi bracteis submembranaceis oblongis instructa*; *calycis tubo subrugoso campanulato limbum subaequante*; *corolla cylindrica tenui*; *filamentis anther-longioribus*.

Slender shrub up to 5 meters high; branchlets subterete, glabrous, slender, brownish, becoming cinereous; petioles rugose, 4 to 6 mm. long, slender, glabrous; leaf blades oblong or ovate-oblong, 4.5 to 7 cm. long, 1.5 to 2.5 cm. broad, cuneate at base, long-acuminate at apex, entire at margins, glabrous or sparsely and minutely brown-pilose beneath, obscurely 5-ply-nerved, the secondary nerves oriented near base, with the midnerve nearly plane above, slightly raised beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence terminal or axillary, short-racemose (rachis slender, not more than 2 cm. long), 5 to 10 flowered, glabrous in all parts, deciduously bracteate at base with submembranous oblong bracts up to 2 cm. long and 1 cm. broad; pedicels rugose, 3 to 5 mm. long, each subtended by a deciduous bract, deciduously bibracteolate near base with oblong bractlets about 1 mm. long; calyx tube subrugose, campanulate, about 2 mm. long and 3 mm. in diameter at anthesis; limb suberect, submembranous, 1 to 2 mm. long including lobes, the lobes triangular, acute, about 1 mm. long, each flanked by an elongate callose thickening; corolla cylindric, thin-carnose, 12 to 14

mm. long, about 2.5 mm. in diameter, the lobes triangular, subacute, about 1 mm. long; stamens subequal (alternate filaments and anthers compensatingly unequal), 10 to 12 mm. long; filaments castaneous, slender, distinct, glabrous or sparsely puberulous distally, about 2 mm. and 4 mm. long, respectively; anthers pale yellow, submembranous, the sacs slightly granular, 2.5 to 3 mm. long, the tubules flexible, about 7 mm. and 5.5 mm. long, respectively; stigma peltate; young fruit coriaceous, subspherical, up to 5 mm. in diameter, surmounted by the persistent calyx limb.

Type in the U. S. National Herbarium, no. 1,351,688, collected on open hillside in mountains east of Las Vegas, Department of Santander, Eastern Cordillera, Colombia, altitude 3,000 to 3,200 meters, December 21, 1926, by E. P. Killip and A. C. Smith (no. 15871). Duplicate at Y.

DISTRIBUTION: Eastern and Central Cordilleras of central Colombia, altitude 1,600 to 3,200 meters.

COLOMBIA.

SANTANDER: Las Vegas, *Killip & Smith* 15997 (N, Y).

ANTIOQUÍA: Santa Rosa, *Lehmann* 7447 (B, F, G, K, N).

These specimens seem to merit specific recognition on the basis of their slender habit. The specimens from Antioquía are slightly more robust than those from the Eastern Cordillera, but are best placed with this species.

47. *Cavendishia pseudopubescens* (Klotzsch) Hoer. Bot. Jahrb. Engler 42: 280. 1909.

Thibaudia pubescens var. *parvifolia* Benth. Pl. Hartw. 224. 1846.

Proclesia pseudopubescens Klotzsch, Linnaea 24: 33. 1851.

Chupalon pseudopubescens Kuntze, Rev. Gen. Pl. 2: 384. 1891.

Shrub; branchlets subterete, brownish or cinereous, pubescent with pale spreading hairs up to 0.4 mm. long, becoming glabrous; petioles subterete, 4 to 7 mm. long, sparsely pilose or glabrous; leaf blades oblong or ovate-oblong, 8 to 11 cm. long, 3.5 to 4 cm. broad, cuneate or rounded at base, obtuse or obtusely acuminate at apex, entire and slightly revolute at margins, glabrous or sometimes puberulous on nerves beneath and sparsely pilose with minute brown hairs, 5-plexi-nerved, the secondary nerves oriented near base, ascending, with the midnerve slightly impressed above, prominent beneath, the veinlets obscurely reticulate; inflorescence terminal, subfasciculate (rachis less than 1 cm. long), 5 to 10 flowered, bracteate at base and partly enveloped by several subcoriaceous, ovate, thin-margined, deciduously sparse-puberulous bracts up to 2 cm. long and 1.2 cm. broad; pedicels subterete, glabrous, 4 to 5 mm. long, each subtended by a deciduous bract, bibracteolate near base with ovate glandular-margined bractlets about 1.5 mm. long; calyx coriaceous, glabrous, the tube broadly campanulate, about 3 mm. long and 4 mm. in diameter at anthesis, the limb suberect, submembranous, about 1 mm. long including lobes, the lobes triangular, apiculate, less than 1 mm. long, thin-margined; corolla subcylindric, 16 to 20 mm. long, about 4 mm. in diameter, glabrous, the lobes triangular, subacute, about 1 mm. long; stamens incomplete in our specimens but apparently subequal and nearly as long as corolla; tubules 8 to 10 mm. long; stigma truncate.

TYPE LOCALITY: Mount Pitayo, Department of El Cauca, Colombia, altitude 3,100 to 3,400 meters. Type collected by Hartweg (no. 1220).

DISTRIBUTION: Known only from the type collection.

COLOMBIA.

EL CAUCA: Mount Pitayo, *Hartweg* 1220 (B, type, K, Y).

A species of doubtful affinity, marked by its subpuberulous character. The pubescence of the bracts is especially noticeable.

48. *Cavendishia miconioides* A. C. Smith.*Thibaudia melastomoides* H. B. K. Nov. Gen. & Sp. 3:272. 1818.*Proclesia melastomoides* Klotzsch, Linnaea 24:32. 1851.*Cavendishia melastomoides* Hoer. Bot. Jahrb. Engler 42:279. 1909, not Hemsl. 1881.

Shrub or low tree with subscandent branches; branchlets subterete or longitudinally striate, brownish, glabrous, slender; petioles subterete or slightly rugose, glabrous, 3 to 4 mm. long; leaf blades coriaceous, oblong, 5 to 7 cm. long, 2 to 3 cm. broad, subcordate at base, subacute or obtusely acuminate at apex, entire at margins, glabrous, 5-plexi-nerved, the secondary nerves oriented near base, with the midnerve slightly impressed above, prominent beneath, the veinlets obscurely reticulate; inflorescence short-racemose, axillary near ends of branchlets, 5 to 10 flowered, glabrous in all parts, bracteate at base and enveloped when young by several submembranous oblong-ovate bracts up to 2 cm. long and 1 cm. broad; pedicels rugose, 5 to 8 mm. long, each subtended by a deciduous bract similar to those at base of racemes, deciduously bibracteolate near base with bractlets about 1 mm. long; calyx tube campanulate, 1.5 to 2 mm. long and about 2.5 mm. in diameter at anthesis; limb erecto-patent, about 2 mm. long including lobes, the lobes triangular, acute, 1 to 1.5 mm. long, somewhat thickened at margins, the sinuses rounded; corolla cylindric, 15 to 17 mm. long, about 4 mm. in diameter, the lobes oblong, subacute, about 1.5 mm. long, often reflexed; stamens subequal (alternately differing by about 1 mm.), about 13 mm. and 14 mm. long, respectively; filaments castaneous, distinct or loosely coherent at base, sparsely pilose distally, about 2 mm. and 4 mm. long, respectively; anther sacs slightly granular, 5 to 6 mm. long; tubules flexible, 5.5 to 7 mm. long; stigma peltate; young fruit spherical, rugose, grayish green, glabrous, up to 8 mm. in diameter.

TYPE LOCALITY: Andes of Colombia, altitude 2,400 to 2,800 meters. Type collected by Humboldt and Bonpland.

DISTRIBUTION: Andes of southern Colombia, altitude 1,300 to 2,800 meters.

COLOMBIA.

HUILA: East of Neiva, *Rusby & Pennell* 567A, in part (Y), 847 (N, Y), 990 (F, N, Y).

EL CAUCA: Río Paez Valley, Tierra Adentro, *Pittier* 1226 (N). Popayán, *Lehmann* 8418 (F, G, K, N). Between Cuatro Esquinas and Río Piendamó, *Pennell & Killip* 6397 (N, Y).

This species is separated from *C. acuminata* by its strictly oblong leaves, obtuse leaf apex, and subcordate leaf base. Although I have not seen type material, the above specimens appear to agree precisely with the original description.

The necessity for a new name has already been discussed, in connection with the Central American *C. melastomoides*.

49. *Cavendishia acuminata* (Hook.) Hemsl. Biol. Centr. Amer. Bot. 2:272. 1881.*Thibaudia acuminata* Hook. Icon. Pl. 2:pl. 111. 1837.*Thibaudia hookeri* Walp. Repert. Bot. 6:412. 1847.*Proclesia acuminata* Klotzsch, Linnaea 24:34. 1851.*Proclesia benthamiana* Klotzsch, Linnaea 24:33. 1851.†*Thibaudia hendersoni* Regel, Gartenflora 24:258. pl. 840. 1875.*Chupalon acuminatum* Kuntze, Rev. Gen. Pl. 2:383. 1891.*Chupalon benthamianum* Kuntze, Rev. Gen. Pl. 2:384. 1891.*Cavendishia benthamiana* Hoer. Bot. Jahrb. Engler 42:278. 1909.

?*Cavendishia hendersoni* Hoer. Bot. Jahrb. Engler 42:281. 1909.

Cavendishia pilgeriana Hoer. Bot. Jahrb. Engler 42:322. 1909.

Cavendishia secundiflora Hoer. Bot. Jahrb. Engler 42:323. 1909.

Shrub up to 10 meters high; branchlets striate, glabrous, brownish or cinereous; petioles rugose, glabrous, 3 to 7 mm. long; leaf blades ovate or ovate-oblong, 6 to 9 cm. long, 2.5 to 4 cm. broad, rounded or broadly cuneate at base, acuminate at apex, entire at margins, glabrous or sparsely pilose on both surfaces with scattered short appressed brown hairs, 5 to 7 pinnately-nerved, the secondary nerves oriented near base, with the midnerve slightly impressed above, raised beneath, the veinlets obscurely reticulate; inflorescence axillary or terminal, subfasciculate or short-racemose, 6 to 15 flowered, bracteate at base and partly enveloped by numerous papyraceous oblong-ovate bracts up to 2 cm. long and 1 cm. broad; pedicels rugose, 6 to 8 mm. long, glabrous, each subtended by a bract similar to those at base of inflorescence, deciduously bibracteolate at base with oblong sparsely glandular-margined bractlets about 2.5 mm. long; calyx rugose, glabrous, the tube short-cylindric, about 3 mm. long and 4 mm. in diameter at anthesis, the limb suberect, about 3.5 mm. long including lobes, the lobes triangular, acute, about 2 mm. long, sparsely pilose-margined, sometimes glandular-margined (glands minute, short-stalked); corolla subcylindric, glabrous, 18 to 25 mm. long, 5 to 6 mm. in diameter, the lobes triangular, subacute, about 1 mm. long; stamens 13 to 19 mm. long; filaments nigrescent, slender, puberulous distally with lax hairs about 0.2 mm. long, distinct, about 4 mm. and 6 mm. long, respectively; anthers pale yellow, membranaceous, the sacs smooth, 4 to 5 mm. long, the tubules flexible, 7 to 11 mm. and 5 to 9 mm. long, respectively; stigma peltate.

TYPE LOCALITY: Quito, Province of Pichincha, Ecuador. Type collected by Hall (no. 40).

DISTRIBUTION: Andes of western Colombia to Bolivia, altitude 1,700 to 3,500 meters.

COLOMBIA: *Purdie* (G, Y).

CALDAS: Santa Elena, above Santuario, *Pennell* 10314 (N, Y). Cerro Tatamá, *Pennell* 10509 (Y), 10538 (Y).

EL CAUCA: Río Palo Basin, Tierra Adentro, *Pittier* 1071 (N).

NARIÑO: Pasto, *Jameson* 444 (K); *André* (K). Tabano, *André* (K), 3004 (K).

ECUADOR: *Jameson* 290 (K); *Sodi* 92/18 (B, type of *C. pilgeriana*). Mindo, *André* (K). Chillo Valley, *Anthony & Tate* 210 (N).

PICHINCHA: Vicinity of Quito, Mount Pichincha, etc., without collector (G); *Jameson* (B, G, Y), 166 (K), 226 (K), 321 (K); *Couthouy*, in 1855 (F, G, Y); *Hartweg* 1219 (B, type of *C. benthamiana*, K, Y); *Hill*, in 1833 (B); *Lehmann* 160 (N); *Sodi* 92/16 (B), 92/17 (B); *Hitchcock* 20879 (N, Y); *Firmin* 172 (N), 320 (N, Y); *Hall* 40 (K, type).

TUNGURAGUA: Mount Tunguragua, *Sodi* 92/18c (B, type of *C. secundiflora*). Las Juntas, *Rose, Pachano, & Rose* 23169 (N, Y). Ambato, *J. N. & G. Rose* 22378 (N, Y), 23777 (N).

LOJA: Loja, *Popenoe* 1328 (N).

PERU: *Lobb* (K), *Macleay* (K).

AMAZONAS: Chachapoyas, *Mathews* 1444 (K).

HUÁNUCO: Panao, *Macbride & Featherstone* 2227 (F). María del Valle, *Macbride* 3558 (F).

JUNÍN: Pichis Trail, Eneñas, *Killip & Smith* 25677 (N, Y).

BOLIVIA: Ananca, Cerro de Gilusani, *Mandon* 550 (K).

LA PAZ: Coroico, *Bang* 2373 (B, F, G, N, Y).

Precisely the same situation as that which prevails in the *cordifolia-bracteata* group is found here. The species recognized in this section of the key have very slight morphological differences, but names have been given to them by previous students and a fairly constant geographic status is observable. The typical Ecuador form, with ovate sharp-acuminate subcoriaceous dull leaves is not difficult to distinguish from the Venezuelan form (*C. splendens*) with its oblong coriaceous nitid leaves. But there are several collections, especially those from western Colombia, which seem intermediate. The form described as *C. weberbaueri* appears to be somewhat more distinct, but the differences are those of habit and are difficult to express. In my opinion *C. pilgeriana* and *C. secundiflora* show no essential differences from other Ecuador material.

Local names for *C. acuminata* in Ecuador are: "Joyapa," "hualicon."

50. *Cavendishia splendens* (Klotzsch) Hoer. Bot. Jahrb. Engler 42:279. 1909.

Proclesia splendens Klotzsch, Linnaea 24:34. 1851.

Chupalon splendens Kuntze, Rev. Gen. Pl. 2:384. 1891.

Compact shrub 2 to 4 meters high; branchlets subterete, brownish, glabrous; petioles rugose, nigrescent or brownish, slightly angled, 4 to 8 mm. long; leaf blades oblong or ovate-oblong, thick-coriaceous, 6 to 10 cm. long, 3 to 5 cm. broad, subcordate or truncate or broadly cuneate at base, subacuminate at apex, entire at margins, glabrous, sparsely brown-punctate beneath, 5 to 7 pli-nerved, the secondary nerves oriented near base, arcuate-ascending, approximate, with the midnerve shallowly impressed above, raised beneath, the veinlets reticulate, slightly impressed above, plane beneath; inflorescence axillary or terminal, subfasciculate or short-racemose (rachis less than 1 centimeter long), 5 to 10 flowered, glabrous in all parts, bracteate at base and partially enveloped by papyraceous oblong bracts up to 2 cm. long and 1 cm. broad; pedicels subterete, 3 to 7 mm. long, each subtended by a deciduous bract, bibracteolate at base with ovate acute bractlets about 1.5 mm. long; calyx tube campanulate, about 2.5 mm. long and 3 mm. in diameter at anthesis; limb suberect, about 2 mm. long including lobes, the lobes ovate, acute, about 1 mm. long, glabrous or sparsely margined with glandular hairs up to 0.2 mm. long, the sinuses rounded; corolla cylindric, 13 to 15 mm. long, about 3.5 mm. in diameter, contracted above, the lobes triangular, subacute, about 1 mm. long; stamens about 14 mm. and 15 mm. long, respectively; filaments dark castaneous, distinct, pilose at margins distally with hairs about 0.2 mm. long, about 2 mm. and 3 mm. long, respectively; anther sacs slightly granular, about 4 mm. and 5 mm. long respectively; tubules wide, flexible, about 10 mm. and 8 mm. long, respectively; stigma peltate; young fruit subspherical, up to 7 mm. in diameter, glabrous.

TYPE LOCALITY: Venezuela or Colombia. Type collected by Karsten (no. 6).

DISTRIBUTION: Andes of Venezuela and eastern Colombia, altitude 1,000 to 3,000 meters.

VENEZUELA.

FEDERAL DISTRICT: Caracas, *Linden* 50 (K), 355 (K); *Jahn* 199 (N).

ARAGUA: Colonia Tovar, *Moritz* 1663 (B, K); *Fendler* 736 (G, K, Y);

Pittier 9263 (G, N, Y); *Jahn* 1311 (N, Y); *Allart* 384 (N).

MÉRIDA: Páramo del Tambor, *Jahn* 745 (N). Tabay, *Gehriger* 405 (Y). 583 (N).

COLOMBIA OR VENEZUELA: *Karsten* 6 (B, type).

COLOMBIA: *Purdie* (K).

NORTE DE SANTANDER: Province of Ocaña, *Schlim* 1095 (K). Páramo del Hatico, between Pamplona and Toledo, *Killip & Smith* 20588 (N, Y), 20674 (N, Y), 20676 (N, Y).

SANTANDER: Las Vegas, *Killip & Smith* 15978 (N, Y), 15980 (N, Y), 16090 (N, Y). California, *Killip & Smith* 16764 (N, Y). Charta, *Killip & Smith* 18950 (N, Y).

The relationship of this plant to *C. acuminata* is discussed in connection with that species. A local name in Venezuela is "coral."

51. *Cavendishia weberbaueri* Hoer. Bot. Jahrb. Engler 42: 324. 1909.

Shrub about 3 meters high; branchlets subterete, stramineous, glabrous; petioles terete, castaneous, glabrous, 6 to 8 mm. long; leaf blades oblong or ovate-oblong, 11 to 15 cm. long, 4 to 6 cm. broad, broadly cuneate at base, caudate-acuminate at apex, entire at margins, glabrous, 5-plexi-nerved, the secondary nerves oriented near base, with the midnerve slightly impressed above, prominent beneath, the veinlets obscurely reticulate; inflorescence axillary or terminal, racemose, 8 to 15 flowered, glabrous in all parts, bracteate at base and partly enveloped by several submembranous oblong-ovate bracts up to 20 mm. long and 12 mm. broad; rachis subterete, 2 to 4 cm. long at maturity; pedicels subrugose, 8 to 10 mm. long, each subtended by a deciduous bract similar to those at base of racemes, bibracteolate near base with linear-oblong subcoriaceous thick-margined bractlets about 4 mm. long; calyx tube campanulate, about 3 mm. long and 4 mm. in diameter at anthesis; limb suberect, about 2.5 mm. long including lobes, the lobes triangular, subacute, 1.5 to 2 mm. long, thick-margined except at apex, usually eglandular; corolla carnose, cylindric, 16 to 18 mm. long, about 5 mm. in diameter, the lobes triangular, subacute, about 1 mm. long; stamens 13 to 15 mm. long; filaments dark castaneous, carnose, distinct, sparsely puberulous at margins distally, about 3 mm. and 6 mm. long, respectively; anther sacs slightly granular, 4.5 to 5 mm. long; tubules wide, about 6.5 mm. and 5 mm. long, respectively; stigma peltate.

TYPE LOCALITY: Moyobamba, Department of Amazonas, Peru, altitude 1,300 to 1,400 meters. Type collected by Weberbauer (no. 4739).

DISTRIBUTION: Andes of Peru, altitude 1,300 to 2,400 meters.

PERU.

AMAZONAS: Moyobamba, *Weberbauer* 4739 (B, type).

CUZCO: Marcapata Valley, *Weberbauer* 7816 (F). Cerro de Cusilluyoc, *Pennell* 14009 (F), 14015 (F).

The absence of this plant in collections from central Peru is surprising, but possibly is owing to scant collecting in that region. It is very close to *C. acuminata*, from which it is distinguished by its larger and longer-acuminate leaves.

52. *Cavendishia ulei* Hoer. Verh. Bot. Ver. Brand. 50: 93. 1909.

Branching shrub 1 to 3 meters high; branchlets subterete, subrugose, glabrous; petioles rugose, stout, 2 to 3 mm. in diameter, 7 to 9 mm. long, glabrous; leaf blades oblong, 10 to 13 cm. long, 3.5 to 5 cm. broad, rounded at base, short-acuminate at apex, entire and slightly revolute at margins, glabrous above, glabrous beneath or sparsely pilose with short brown appressed hairs, 7-plexi-nerved, the secondary nerves oriented near base, ascending, with the midnerve impressed above, prominent beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence axillary, short-racemose, 10 to 15 flowered,

glabrous in all parts, bracteate at base and enveloped when young by numerous papyraceous oblong-ovate bracts up to 2 cm. long and 1.5 cm. broad; rachis stout, angled, 3 cm. long at maturity; pedicels subrugose, stout, 6 to 8 mm. long, each bracteate at base (bracts similar to those at base of inflorescence), bibracteolate near base (bractlets lanceolate, about 4 mm. long), slightly swollen distally; calyx tube coriaceous, campanulate, 3 to 4 mm. long, 3 to 5 mm. in diameter at anthesis; limb suberect, 2 to 4 mm. long including lobes, the lobes deltoid, acute, 1.5 to 3 mm. long, glandular-margined; corolla thin-carnose, 16 to 17 mm. long, 4 to 5 mm. in diameter, the lobes about 1 mm. long; stamens about 13 mm. long; filaments dark castaneous, distinct, glabrous, 1.5 to 2 mm. and about 3 mm. long, respectively; anther sacs slightly granular, 3 to 4 mm. long; tubules membranous, about 9 mm. and 8 mm. long, respectively; stigma truncate; young fruit campanulate, surmounted by the incurved calyx lobes.

TYPE LOCALITY: Cerro de Escalero, Department of San Martín, Peru, altitude 1,300 meters. Type collected by Ule (no. 6789).

DISTRIBUTION: Andes of northern Peru, altitude 1,300 to 2,500 meters.

PERU.

CAJAMARCA: Huancabamba, *Weberbauer* 6122 (B, F).

SAN MARTÍN: Cerro de Escalero, *Ule* 6789 (B, type, Go).

This species and the three following are all closely related, but are specifically distinct on characters of leaf venation and flower size, as mentioned in the key.

53. *Cavendishia capitata* (Benth.) Hoer. Bot. Jahrb. Engler 42: 279. 1909.

Thibaudia capitata Benth. Pl. Hartw. 142. 1844.

Proclesia capitata Klotzsch, Linnaea 24: 34. 1851.

Chupalon capitatum Kuntze, Rev. Gen. Pl. 2: 384. 1891.

Stout branching shrub; branchlets subterete or angled, stout, about 5 mm. in diameter near apices; petioles rugose, glabrous, stout, 7 to 10 mm. long; leaf blades coriaceous, glabrous on both surfaces, oblong or ovate-oblong, 14 to 16 cm. long, 6 to 7 cm. broad, rounded or broadly cuneate at base, short-acuminate at apex, entire or slightly revolute at margins, 7 to 9 pli-nerved, the secondary nerves oriented near base, ascending, with the mid-nerve impressed above, prominent beneath, the veinlets reticulate, plane on both surfaces; inflorescence axillary, subfasciculate or short-racemose (rachis stout, not more than 1 cm. long), 8 to 15 flowered, glabrous in all parts, enveloped by numerous subcoriaceous oblong-ovate bracts up to 3 cm. long and broad; pedicels subterete, stout, 1 to 2 mm. in diameter, about 2 mm. long, each bracteate at base and deciduously bibracteolate near base; calyx tube coriaceous, campanulate, 4 to 5 mm. long, about 5 mm. in diameter at anthesis; limb suberect, subcoriaceous, about 3 mm. long including lobes, the lobes triangular, about 2.5 mm. long, glandular-margined and sparsely glandular without; corolla subcoriaceous, cylindric, 22 to 30 mm. long, 4 to 5 mm. in diameter, the lobes about 1.5 mm. long; stamens about 22 mm. long; filaments dark castaneous, distinct, sparsely pilose distally, 4 mm. and 6 mm. long, respectively; anther sacs slightly granular, about 5 mm. long; tubules flexible, about 14 mm. and 12 mm. long, respectively; stigma peltate.

TYPE LOCALITY: Mount Yangana, Province of Loja, Ecuador. Type collected by Hartweg (no. 786*).

DISTRIBUTION: Known only from the type collection.

ECUADOR.

LOJA: Mount Yangana, *Hartweg* 786* (K, type).

54. *Cavendishia nobilis* Lindl. Bot. Reg. 21: sub pl. 1791. 1836.

Chupalon nobile Kuntze, Rev. Gen. Pl. 2: 384. 1891.

Stout branching shrub; branchlets terete, stramineous, glabrous, stout; petioles subrugose, stout, 2 to 3 mm. in diameter, 7 to 8 mm. long, glabrous; leaf blades oblong, 12 to 16 cm. long, 5 to 6 cm. broad, rounded or broadly cuneate at base, acute at apex(?), entire and slightly reflexed at margins, glabrous above, glabrous or very sparsely brown-pilose beneath, 7 to 9 pli-nerved, the secondary nerves oriented near base, ascending, with the midnerve impressed above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary (traumatic in our specimen?), bracteate at base with numerous papyraceous oblong-ovate bracts up to 4 cm. long and 3 cm. broad (bracts pilose without with spreading white hairs up to 0.5 mm. long); flowers not seen.

TYPE LOCALITY: Peru. Type collected by Mathews (number not cited).

DISTRIBUTION: Known only from the Andes of Peru.

PERU: Mathews 2078 in part (K, type).

The description of the flower by Lindley is that of a flower of *Psammisia coarctata*, which was collected by Mathews under the same number. As this is the type species of *Cavendishia*, the matter is of some importance. The specimen at Kew is without flowers, and it is a matter of doubt to me whether or not Lindley saw the flowers which belonged to the plant. Hoerold referred the name *C. nobilis* to *C. capitata* (a later name), but I believe the two plants are distinct on the basis of the pubescent bracts of *C. nobilis*.

55. *Cavendishia urbaniana* Hoer. Bot. Jahrb. Engler 42: 329. 1909.

Robust branching shrub up to 4 meters high; branchlets subterete or angled, stramineous, glabrous, stout; petioles subrugose, glabrous, stout, 8 to 12 mm. long; leaf blades oblong, 14 to 18 cm. long, 4 to 5.5 cm. broad, rounded at base, obtusely acuminate at apex, entire and slightly revolute at margins, glabrous above, glabrous and nigrescent-punctate beneath, rigidly coriaceous, 7 to 9 pli-nerved, the nerves oriented above base to a distance of 5 cm. ascending, with the midnerve impressed above, prominent beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence axillary, subfasciculate or short-racemose (rachis stout, up to 15 mm. long), 12 to 20 flowered, glabrous in all parts, enveloped when young by numerous papyraceous oblong-ovate bracts up to 2.5 cm. long and 2 cm. broad; pedicels subrugose, stout, about 2 mm. in diameter and 4 mm. long, each bracteate at base and bibracteolate near base, the bractlets lanceolate, about 2.5 mm. long; calyx rigidly coriaceous, the tube campanulate, about 4 mm. long and 4 mm. in diameter at anthesis, the limb suberect, 2 to 3 mm. long including lobes, the lobes triangular, acute, 1.5 mm. long, sparsely glandular-margined; corolla thin-carnose, about 22 mm. long, 5 to 7 mm. in diameter, the lobes triangular, about 1 mm. long; stamens nearly as long as corolla; filaments dark castaneous, distinct, puberulous within, about 4 mm. and 6 mm. long, respectively; anther sacs nearly smooth, 5 to 6 mm. long; tubules about 11 mm. and 8 mm. long, respectively; stigma subpeltate.

TYPE LOCALITY: Monson, Department of Huánuco, Peru, altitude 1,600 to 1,900 meters. Type collected by Weberbauer (no. 3518).

DISTRIBUTION: Known only from the type collection.

PERU.

HUÁNUCO: Monson, Weberbauer 3518 (B, type).

From the three preceding species *C. urbaniana* is distinguished by having the nerves united for some distance above the leaf base.

DOUBTFUL SOUTH AMERICAN SPECIES

THIBAUDIA CAULIALATA R. & P. Fl. Peruv. Chil. 4: pl. 386. 1802.

Thibaudia alata Dun.; DC. Prodr. 7:562. 1839.

Proclesia alata Klotzsch, Linnaea 24:34. 1851.

Chupalon alatum Kuntze, Rev. Gen. Pl. 2:384. 1891.

Cavendishia alata Hoer. Bot. Jahrb. Engler 42:279. 1909.

TYPE LOCALITY: Peru. Type collected by Dombey (?).

The plant figured by Ruiz and Pavon under the name *Thibaudia caulialata* and subsequently described by Dunal as *Thibaudia alata* is apparently a true *Cavendishia*, but I am unable to associate it with any species known to me. In view of the fact that I have not seen the type, I hesitate definitely to make the implied combination.

THIBAUDIA MARTII Meissn. in Mart. Fl. Bras. 7:173. 1863.

TYPE LOCALITY: Brazil. Type collected by Martius.

From the description of this species I conclude that it is a *Cavendishia* rather than a *Thibaudia*, but failing to see the type I do not definitely make the combination.

CAVENDISHIA STROBILIFERA (H. B. K.) Hoer. Bot. Jahrb. Engler 42:279. 1909.

Thibaudia strobilifera H. B. K. Nov. Gen. & Sp. 3:272. 1818.

Proclesia strobilifera Klotzsch, Linnaea 24:32. 1851.

Chupalon strobiliferum Kuntze, Rev. Gen. Pl. 2:384. 1891.

TYPE LOCALITY: Near Loja, Province of Loja, Ecuador. Type collected by Humboldt and Bonpland.

I have not seen type material of this species, which is probably allied to or possibly equal to *C. acuminata*.

18. ORTHAEA Klotzsch, Linnaea 24:23. 1851

(*Findlaya* Hook. f. in Benth. & Hook. Gen. Pl. 2:569. 1876)

Calyx tube articulate with pedicel, subcylindric or campanulate; limb sub-erect, 5-lobed (rarely more), the lobes triangular, sometimes truncate; corolla subcylindric, 5-lobed; stamens 10, alternately unequal, usually about one-third as long as corolla; filaments attached to the anther dorsally near its base, alternately unequal; anthers submembranous, equal or subequal, the sacs nearly smooth, the tubules about as long as the sacs, wide, opening by terminal or oblique pores; style filiform, about as long as corolla.

Low shrubs, frequently epiphytic, with alternate, pinnate-veined or pli-nerved, petioled, subcoriaceous leaves; inflorescence axillary or terminal, racemose, subfasciculate, or 1 or 2 flowered; flowers pedicelled, the pedicels sometimes subtended by large bracts, deciduously bibracteolate.

DISTRIBUTION: Tropical South America from Colombia to northern Bolivia and eastward to British Guiana and Trinidad. Eleven species are here described and in addition there is one name which I am unable to place.

This genus is marked by short stamens with alternately unequal filaments and subequal anthers. *O. secundiflora* (Poepp. & Endl.) Klotzsch is the type species.

KEY TO THE SPECIES

Leaves broadly oblong, 5 to 7 cm. broad, cordate at base (Eastern Cordillera of Colombia).

Inflorescence about 15 cm. long, pubescent in all parts, without large bracts.

1. *O. cordata*.

Inflorescence short (rachis about 1 cm. long), glabrous in all parts, with cavendishoid bracts----- 2. *O. cavendishioides*.
Leaves oblong, not more than 4 cm. broad, attenuate, cuneate, or truncate at base.

Anthers opening by terminal or essentially terminal pores.

Inflorescence nearly as long as or longer than leaves (rachis 4 to 10 cm. long); flowers secund.

Corolla about 25 mm. long; flowers about 1 per cm. of rachis; leaves 3 to 4 cm. broad (northern Peru)----- 3. *O. secundiflora*.

Corolla 11 to 14 mm. long; flowers 2 to 4 per cm. of rachis; leaves about 2 cm. broad (northern Bolivia)----- 4. *O. constans*.

Inflorescence short (rachis less than 3 cm. long, rarely 4 cm. long in no. 5).

Leaves chartaceous, the secondary nerves raised above; rachis more than 1.5 cm. long (Bolivia)----- 5. *O. boliviensis*.

Leaves coriaceous, the secondary nerves plane or impressed above; rachis not more than 1 cm. long.

Branchlets and inflorescence glabrous; pedicels 4 to 6 mm. long; corolla about 10 mm. long; anthers less than 2 mm. long (southern Peru).

6. *O. breviflora*.

Branchlets and inflorescence often puberulous; pedicels 10 to 12 mm. long; corolla about 30 mm. long; anthers 4 mm. long (northern Peru)----- 7. *O. engleriana*.

Anthers opening by oblique clefts.

Inflorescence a many-flowered raceme 2 cm. long or more; calyx lobes triangular, apiculate, about 1 mm. long (Peru).

Anthers 2.5 to 3 mm. long; calyx limb callose-thickened at margins except at lobe tips; leaves pinnately-nerved----- 8. *O. weberbaueri*.

Anthers 4 to 4.5 mm. long; calyx limb not callose-thickened at margins; leaves often pinnate-nerved----- 9. *O. pinnatinervia*.

Inflorescence 1 or 2 flowered; calyx limb essentially truncate (Trinidad and British Guiana).

Calyx and branchlets glabrous (Trinidad)----- 10. *O. apophysata*.

Calyx densely hirsute (hairs 3 to 5 mm. long); branchlets copiously hispid-pilose (British Guiana)----- 11. *O. hispida*.

1. *Orthaea cordata* Oliver in Hook. Icon. Pl. 25: pl. 2412. 1895.

Shrub with elongate branches; branchlets striate, stout, stramineous, sparsely puberulous or glabrous; leaf blades subsessile, oblong or ovate-oblong, 13 to 16 cm. long, 5 to 6 cm. broad, cordate and frequently subamplexicaul at base, obtusely acuminate at apex, entire and recurved at margins, coriaceous, essentially glabrous above, deciduously pilose beneath with pale spreading hairs about 0.3 mm. long, 7-nerved from base, the basal pairs of nerves divaricate, the upper pair ascending, with the midnerve nearly plane above, prominent beneath, the veinlets copiously reticulate, slightly raised above, plane beneath; inflorescence apparently terminal, long-racemose, uniformly pilose on all external surfaces with pale spreading hairs about 0.3 mm. long; rachis stout, about 15 cm. long, striate; pedicels 2 to 4 per centimeter of rachis, rugose, 12 to 16 mm. long, bibracteolate near base (bractlets lanceolate, about 2 mm. long, margined with glandular hairs), swollen distally; calyx tube strongly apophysate, about 3 mm. long and 5 mm. in diameter across apophysis; limb divided to base, the lobes 5, 6, or 7, lanceolate-triangular, about 4 mm. long and 2 mm. broad at base, the sinuses acute; corolla 22 to 26 mm. long, 4 to 6 mm. in diameter at base, gradually contracted above, 5-lobed (apparently

always); stamens about 4.5 mm. and 5.5 mm. long, respectively; filaments castaneous, loosely connate, densely pilose without, with spreading white hairs up to 0.5 mm. long, continued into slender connectives which frequently extend into tubules, about 2 mm. and 3 mm. long, respectively; anther sacs 3 mm. long; tubules erect, wide, about 1.5 mm. long, opening by wide terminal pores; stigma subpeltate.

TYPE LOCALITY: Between Ocaña and Pamplona, Department of Norte de Santander, Colombia, altitude about 1,850 meters. Type collected by Kalbreyer (no. 1059).

DISTRIBUTION: Known only from the type collection.

COLOMBIA.

NORTE DE SANTANDER: Between Ocaña and Pamplona, *Kalbreyer* 1059 (B, K, type).

This is a very distinct species by virtue of its large leaves, long inflorescence, and pubescent flowers.

2. *Orthaea cavendishioides* A. C. Smith, sp. nov.

Frutex robustus; laminis oblongis vel ovato-oblongis basi subcordatis apice breviter acuminatis subtus parce pilosis 7-plex-nerviis; inflorescentia subfasciculata vel breviter racemosa glabra, basi bracteis submembranaceis ovato-oblongis instructa; calycis tubo rugoso campanulato limbum subaequante; corolla subcylindrica; staminibus alternatim inaequalibus, filamentis pilosis, antheris leviter inaequalibus, tubulis quam loculis paullo brevioribus poris obliquo-terminalibus dehiscentibus.

Shrub 3 to 4 meters high; branchlets stout, angled or subterete, glabrous, brownish or cinereous; petioles rugose, stout, glabrous, 1 to 3 mm. long; leaf blades oblong or ovate-oblong, 9 to 12 cm. long, 5 to 6 cm. broad, subcordate at base, acute or short-acuminate at apex, entire at margins, glabrous above, deciduously pilose beneath with scattered stiff appressed brown hairs about 0.3 mm. long, 7-plex-nerved, the secondary nerves oriented above base, with the midnerve plane or slightly raised above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary, subfasciculate or short-racemose (rachis about 1 cm. long), 15 to 25 flowered, glabrous in all parts, bracteate at base and partly enveloped by several submembranous, ovate-oblong or obovate bracts up to 3 cm. long and 1 cm. broad; pedicels rugose, 15 to 20 mm. long, each subtended by a bract similar to those at base of racemes, bibracteolate near base with linear, sparsely fimbriate bractlets about 4 mm. long; calyx tube rugose, subcylindric or broadly campanulate, about 2.5 mm. long and 3 mm. in diameter at anthesis; limb subspreading, submembranous, about 2 mm. long including lobes, the lobes apiculate, about 1 mm. long, the sinuses rounded; corolla light red, paler distally, subcylindric, 27 to 33 mm. long, 5 to 6 mm. in diameter, contracted distally, the lobes triangular, subacute, 1 to 1.5 mm. long; stamens about 8.5 mm. and 10.5 mm. long, respectively; filaments castaneous, distinct or loosely coherent at base, densely pilose distally with brown hairs about 0.3 mm. long, 4.5 mm. and 6 mm. long, respectively; anther sacs granular, about 3.5 mm. long; tubules erect, wide, about 2.5 mm. and 1.8 mm. long, respectively, opening by slightly oblique irregular-edged pores; stigma narrowly peltate.

Type in the U. S. National Herbarium, no. 1,351,775, collected in woods at Las Vegas, Department of Santander, Eastern Cordillera, Colombia, altitude 2,600 to 2,900 meters, December 23, 1926, by E. P. Killip and A. C. Smith (no. 15987). Duplicate at Y.

DISTRIBUTION: Known only from the type collection.

Related to *O. cordata* Oliver, from which it differs by having the flowers glabrous and the inflorescence very short-racemose. It should be noted that this is the only *Orthaea* in which the anthers are slightly unequal; also that it is the only species in which the floral bracts are so conspicuous. The presence of these two characters seems to indicate a transitional stage between this genus and *Cavendishia*.

3. *Orthaea secundiflora* (Poepp. & Endl.) Klotzsch, *Linnaea* 24: 24. 1851.

Thibaudia secundiflora Poepp. & Endl. *Nov. Gen. & Sp.* 1: 5. *pl.* 9. 1835.

Slender shrub with elongate branches; branchlets subterete or angled, smooth, glabrous; petioles subterete, about 6 mm. long; leaf blades elliptic or elliptic-lanceolate, 4 to 11 cm. long, 3 to 4 cm. broad, cuneate at base, rigidly acuminate at apex, entire, glabrous, 5-plexi-nerved, the secondary nerves oriented near base; inflorescence axillary, long-racemose, spreading, bracteate at base, glabrous on all external surfaces; rachis slender, 7 to 10 cm. long; pedicels slender, 12 to 20 mm. long; calyx campanulate, about 4 mm. long, the limb suberect, the lobes obtuse, sparsely glandular-margined; corolla subcarnose, cylindric-conical, about 25 mm. long; filaments submembranous, connate in the basal half, the long ones distally pilose; anthers equal, the sacs sparsely setose at base, the tubules slightly longer than the sacs, opening by subterminal pores; stigma subhemispherical.

TYPE LOCALITY: Between Cassapi and Cuchero, Peru. Type collected by Poeppig.

DISTRIBUTION: Apparently known only from the type collection.

I have not seen any specimens referable to this species, which I have redescribed and keyed from the original plate and description.

4. *Orthaea constans* A. C. Smith, sp. nov.

Frutex rigidus; laminis oblongo-lanceolatis basi subattenuatis apice acuminatis obscure 5-plexi-nerviis; inflorescentia racemosa secunda glabra; calycis tubo campanulato quam limbo duplo longiore, lobis apiculatis; corolla subcylindrica; staminibus alternatim inaequalibus, antheris aequalibus, tubulis loculos subaequantibus poris terminalibus dehiscentibus.

Shrub with stiff branches; branchlets subterete, brownish, glabrous; petioles subrugose, glabrous, about 3 mm. long; leaf blades oblong-lanceolate, 7 to 8 cm. long, 1.5 to 2 cm. broad, subattenuate at base, sharp-acuminate at apex, entire at margins, glabrous, obscurely 5-plexi-nerved, the midnerve nearly plane above, raised beneath, the secondary nerves and veinlets slightly raised or plane on both surfaces; inflorescence axillary, racemose, secund, 15 to 20 flowered, glabrous in all parts; rachis straight, striate, 4 to 6 cm. long; pedicels rugose, 8 to 12 mm. long, deciduously bibracteolate near base, swollen distally; calyx tube campanulate, 3 mm. long, 3 to 4 mm. in diameter at anthesis; limb submembranous, 1 to 1.5 mm. long including lobes, the lobes minutely apiculate, about 2 mm. across; corolla submembranous, 11 to 12 mm. long, about 4 mm. in diameter; stamens about 4 mm. and 5 mm. long, respectively; filaments subnigrescent, coherent at base, pilose at distal margins with spreading hairs about 0.2 mm. long, about 1.5 mm. and 2.5 mm. long, respectively; anther sacs slightly granular, 1.5 mm. long; tubules erect, wide, 1.5 mm. long, opening by terminal or subterminal pores; stigma subpeltate.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected at Sandillani, Department of La Paz, Bolivia, altitude 2,150 to 2,450 meters, April, 1866, by R. Pearce.

DISTRIBUTION: Andes of Bolivia, altitude 2,150 to 3,100 meters.

BOLIVIA: Eastern Andes, *Pearce* 814 (K).

Apparently most nearly related to *O. secundiflora*, from which it is separated by the smaller size of all its parts and the more crowded flowers.

EXPLANATION OF PLATE 17.—*Orthaea constans*, from photograph of type sheet. About one-half natural size.

5. *Orthaea boliviensis* Fedtsch. & Basil. Not. Syst. Herb. Hort. Bot. U. S. S. R. 6: 25. 1926.

Low epiphytic shrub; branchlets slender, subterete, brownish, glabrous; petioles rugose, glabrous, 2 to 3 mm. long; leaf blades ovate-oblong, 5 to 8 cm. long, 1.5 to 2.5 cm. broad, cuneate at base, long-acuminate at apex, entire at margins, glabrous, 5-plexi-nerved, the secondary nerves oriented near base, ascending, with the midnerve plane or slightly raised above, raised beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary or terminal, laxly racemose, 6 to 12 flowered, essentially glabrous in all parts, deciduously bracteolate at base by several submembranous oblong bractlets up to 1 cm. long; rachis rugose, 1.5 to 3 cm. long; pedicels subrugose, slender, 10 to 20 mm. long, each subtended by a deciduous bract, bibracteolate near base with linear fimbriate bractlets 2 to 4 mm. long, swollen distally; calyx tube rugose, subcylindric, about 2 mm. long and 3 mm. in diameter at anthesis; limb submembranous, about 2 mm. long including lobes, the lobes apiculate, about 1 mm. long, sparsely glandular-margined, the sinuses rounded; corolla membranous, 15 to 33 mm. long, 3 to 4 mm. in diameter, slightly contracted distally, the lobes triangular, subacute, less than 1 mm. long; stamens 4.5 to 6 mm. and 6 to 7.5 mm. long, respectively; filaments pale castaneous, membranous, connate in the basal half, pilose distally with lax hairs about 0.3 mm. long, 2 to 4 mm. and 3.5 to 5.5 mm. long, respectively; anther sacs slightly granular, about 1 mm. long; tubules wide, about 1.6 mm. long, opening by terminal or subterminal slightly flaring pores; stigma truncate.

TYPE LOCALITY: Bolivia (latitude 15° to 18° south), altitude "2,000 to 13,000 feet." Type collected by Bridges (no. 103).

DISTRIBUTION: Andes of northern Bolivia, altitude about 1,400 meters.

BOLIVIA: *Bridges* (K, type collection?); *Pearce* 731 (K). Quichara, *Pearce*, in November, 1864 (K).

LA PAZ: Tipuani, *Buchtien* 5517 (B, N), 5518 (N, Y), 7432 (B, N, Y).

The Bridges specimen here cited, which agrees exactly with the original description, has shorter corollas than the other specimens, but surely is conspecific with them. The rather lax inflorescence and the thin leaves distinguish this species from its allies.

6. *Orthaea breviflora* A. C. Smith, sp. nov.

Frutex; laminis oblongis vel ovato-oblongis basi late cuneatis apice acuminatis subtus decidue pilosis obscure 5 ad 7 pli-nerviis; inflorescentia subfasciculata vel breve racemosa glabra; calycis tubo subrugoso quam limbo paullo brevior; corolla cylindrica; staminibus alternatim inaequalibus, antheris aequalibus brevibus, tubulis quam loculis paullo brevioribus poris terminalibus dehiscentibus.

Shrub; branchlets terete, glabrous, brownish; petioles subrugose, canaliculate above, 4 to 6 mm. long; leaf blades thick-coriaceous, oblong or ovate-oblong, 5 to 8 cm. long, 2 to 2.5 cm. broad, rounded or broadly cuneate at base, acuminate at apex, entire and slightly revolute at margins, glabrous above, sparsely pilose beneath with appressed brownish hairs about 0.3 mm. long, becoming glabrous, obscurely 5 to 7 pli-nerved, the midnerve slightly impressed above, prominent beneath, the secondary nerves oriented near base, ascending, plane above, slight-

ly raised beneath, the veinlets obscurely reticulate; inflorescence subfasciculate or short-racemose (rachis rugose, rarely more than 1 cm. long), 6 to 10 flowered, glabrous in all parts, deciduously bracteate at base with several submembranous ovate short-fimbriate bracts up to 5 mm. long; pedicels rugose, 4 to 6 mm. long, deciduously bibracteolate near base with linear oblong submembranous bractlets about 2.5 mm. long; calyx tube short-cylindric, subrugose, about 1.5 mm. long and 2 mm. in diameter at anthesis; limb submembranous, about 2.5 mm. long including lobes, the lobes apiculate, about 1 mm. long, the sinuses rounded; corolla red, paler distally, about 10 mm. long, 3 mm. in diameter, contracted distally, the lobes triangular, subacute, about 1 mm. long; stamens about 3 mm. and 3.5 mm. long, respectively; filaments castaneous, membranous, distinct or coherent at base, densely pilose distally with pale soft hairs about 0.2 mm. long, about 1.8 mm. and 2.6 mm. long respectively; anther sacs nearly smooth, about 1 mm. long; tubules erect, wide, about 0.7 mm. long, opening by terminal slightly flaring pores; stigma truncate.

Type in the herbarium of the Field Museum of Natural History, no. 558,218, collected in forest at Pillahuata, Cerro de Cusilluyoc, Department of Cuzco, Peru, altitude 2,200 to 2,400 meters, May 3 to 6, 1925, by F. W. Pennell (no. 13972).

DISTRIBUTION: Known only from the type specimen.

Characterized by its very small flowers, rigid branchlets, and coriaceous leaves.

7. *Orthaea engleriana* Hoer. Bot. Jahrb. Engler 42:320. 1909.

Small epiphytic shrub; branchlets subterete, cinereous, deciduously pilose with short pale spreading hairs; petioles subrugose, deciduously puberulous, 2 to 3 mm. long; leaf blades oblong-lanceolate, 8 to 10 cm. long, 2.5 to 3 cm. broad, rounded at base, acuminate at apex, entire at margins, glabrous above, sparsely pilose beneath (hairs brown, appressed, about 0.2 mm. long), 5 to 7 pli-nerved, the secondary nerves oriented near base, sharply ascending, with the midnerve slightly impressed above, raised beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary, short-racemose (rachis puberulous or glabrous, 5 to 10 mm. long), 6 to 10 flowered, circumscribed at base by several deciduous, papyraceous, oblong or spatulate bracts up to 20 mm. long and 7 mm. broad; pedicels striate, sparsely white-pilose, 9 to 12 mm. long, deciduously bracteate at base, bibracteolate near base, the bractlets linear, 1.5 mm. long, puberulous; calyx tube rugose, subcampanulate, sparsely white-pilose, 1.5 to 2 mm. long, 2.5 to 3 mm. in diameter at anthesis; limb submembranous, 1 to 1.5 mm. long including lobes, the lobes 5 or 6, minutely apiculate, about 2 mm. across; corolla submembranous, essentially glabrous, 28 to 32 mm. long, about 5 mm. in diameter, slightly contracted at base and apex, the lobes minutely apiculate; stamens about 7 mm. and 8.5 mm. long, respectively; filaments castaneous, connate in basal half, puberulous or subglabrous, about 3.5 mm. and 5.5 mm. long, respectively; anther sacs slightly granular, 2 mm. long; tubules wide, 2 mm. long, opening by terminal or subterminal pores; stigma truncate.

TYPE LOCALITY: Moyobamba, Department of Amazonas, Peru, altitude 1,400 to 1,500 meters. Type collected by Weberbauer (no. 4753).

DISTRIBUTION: Known only from the type collection.

PERU.

AMAZONAS: Moyobamba, *Weberbauer* 4753 (B, type).

Marked by its large flowers, cavendishoid bracts, and characters of pubescence. The bracts are more noticeable in this species than in any other of the genus excepting *O. cavendishoides*.

8. *Orthaea weberbaueri* Hoer. Bot. Jahrb. Engler 42 : 320. 1909.

Compact shrub up to 3 meters high; branchlets subterete, brownish, glabrous; petioles rugose, 4 to 6 mm. long, glabrous; leaf blades oblong or lanceolate-oblong, 8 to 12 cm. long, 2.5 to 3.5 cm. broad, rounded or broadly cuneate at base, sharp-acuminate at apex, entire and narrowly revolute at margins, glabrous above, sparsely pilose beneath (hairs brown, appressed, not more than 0.2 mm. long), 5 to 7 pinnately-nerved, the secondary nerves oriented near base, ascending, with the midnerve nearly plane above, raised beneath, the veinlets copiously reticulate, slightly raised or plane on both surfaces; inflorescence axillary, racemose, 15 to 25 flowered, essentially glabrous in all parts, the flowers secund; rachis straight, stout, 3 to 5 cm. long; pedicels rugose, 8 to 13 mm. long, deciduously bibracteolate near base (bractlets about 1 mm. long), swollen distally; calyx tube strongly rugose, apophysate, about 2.5 mm. long and 3 mm. in diameter at anthesis; limb submembranous, about 1.5 mm. long including lobes, the lobes triangular-ovate, 1 to 1.5 mm. long, callose-margined except at apices, the sinuses acute; corolla submembranous, 15 to 18 mm. long, about 4 mm. in diameter, the lobes triangular, apiculate; stamens about 4.5 mm. and 6.5 mm. long, respectively; filaments castaneous, loosely coherent at base, pilose within with pale spreading hairs, about 2.5 mm. and 4 mm. long, respectively; anther sacs 1.5 mm. long; tubules 1 mm. long, opening by wide introrse clefts nearly as long; stigma truncate or subpeltate.

TYPE LOCALITY: Sandía, Department of Cuzco, Peru, altitude 2,900 meters. Type collected by Weberbauer (no. 684).

DISTRIBUTION: Andes of southern Peru and northern Bolivia, altitude 2,500 to 2,900 meters.

PERU.

Cuzco: Sandía, *Weberbauer* 684 (B, type).

BOLIVIA.

LA PAZ: Sandillani, *Pearce*, in April, 1866 (K).

This species and the following make up a distinct group within the genus, having in common a racemose inflorescence and tubules with oblique pores. They are readily distinguished from one another as noted in the key.

9. *Orthaea pinnatinervia* Mansf. Notizbl. Bot. Gart. Berlin 9 : 438. 1925.

Subscandent shrub up to 4 meters high; branchlets subterete, slender, castaneous or cinereous, puberulous when young with pale hairs about 0.2 mm. long; petioles subrugose, puberulous or glabrous, 2 to 4 mm. long; leaf blades oblong, 4 to 7 cm. long, 1.5 to 2 cm. broad, truncate at base, long-acuminate at apex, subentire at margins, essentially glabrous above, sparsely pilose beneath with appressed slender brown hairs about 0.3 mm. long, becoming glabrous, pinnate-veined, the midvein slightly impressed above, prominent beneath, the secondary veins 2 to 4 per side, ascending or spreading, plane above, slightly raised beneath, the veinlets reticulate, slightly raised beneath; inflorescence axillary, short-racemose, 8 to 15 flowered, deciduously bracteate at base with oblong bracts about 5 mm. long; rachis rugose, 1 to 2 cm. long, glabrous or sparsely puberulous; pedicels rugose, 5 to 8 mm. long, glabrous, each subtended by a deciduous bract, bibracteolate near base with linear-oblong glabrous bractlets 3 to 4 mm. long, slightly swollen distally; calyx tube rugose, subcylindric, slightly apophysate at base, glabrous, 2 to 2.5 mm. long, about 3.5 mm. in diameter at base, contracted above; limb spreading, submembranous, about 3 mm. long including lobes, the lobes apiculate, about 1 mm. long, the sinuses rounded; corolla subcoriaceous, pale red, greenish white distally, 15 to 18 mm. long, contracted distally, the lobes triangular, subacute, about 1.5 mm.

long; stamens about 5 mm. and 6.5 mm. long, respectively; filaments castaneous, distinct, pilose distally with lax pale hairs up to 0.2 mm. long, about 2 mm. and 3 mm. long, respectively; anther sacs slightly granular, slender, glabrous or subpuberulous at base, about 2 mm. long; tubules flaring, about 2.5 mm. long, opening by broad oval pores about half as long; stigma truncate.

TYPE LOCALITY: Cosñipata, between the tambos Tres Cruces and Tambomayo, Department of Cuzco, Peru, altitude 3,300 to 3,400 meters. Type collected by Weberbauer (no. 6925).

DISTRIBUTION: Andes of southern Peru, altitude 3,000 to 3,400 meters.

PERU.

Cuzco: Cosñipata, *Weberbauer* 6925 (B, type, F, N). Marcapata, *Weberbauer* 7814 (F).

10. *Orthaea apophysata* (Griseb.) A. C. Smith.

Sophoclesia apophysata Griseb. Fl. Brit. W. Ind. 143. 1864.

Findlaya apophysata Hook. f. in Benth. & Hook. Gen. Pl. 2:569. 1876.

Subscandent epiphytic shrub; branchlets terete, brownish or cinereous, glabrous; petioles subrugose, glabrous, 3 to 5 mm. long; leaf blades coriaceous, ovate, 5 to 7 cm. long, 2.5 to 3 cm. broad, broadly cuneate at base, long-acuminate at apex, entire at margins, glabrous, somewhat nitid, pinnate-veined, the midvein slightly impressed or plane above, prominent beneath, the secondary veins 2 or 3 to a side, ascending, plane or slightly raised above, raised beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary, 1 or 2 flowered, glabrous in all parts; pedicels rugose, 15 to 17 mm. long, bibracteolate near middle with ovate acute bractlets about 1 mm. long, swollen distally; calyx tube slightly rugose, coriaceous, short-cylindric, slightly apophysate at base, about 2.5 mm. long at anthesis, 4 mm. in diameter at base, contracted above; limb coriaceous, about 1.5 mm. long, truncate or minutely 5-apiculate; corolla bright red, carnose, subcylindric, 20 to 22 mm. long, 6 to 7 mm. in diameter, contracted distally, the lobes oblong, subacute, about 4 mm. long; stamens about 6.5 mm. and 7.5 mm. long, respectively; filaments castaneous, submembranous, distinct, distally pilose with minute pale hairs, about 3.5 mm. and 5 mm. long, respectively; anther sacs slightly granular, about 2 mm. long; tubules about 2 mm. long, opening by oblique oval pores less than 1 mm. long; stigma truncate; young fruit subcylindric, slightly apophysate, thick-coriaceous, up to 8 mm. in diameter.

TYPE LOCALITY: Between Arima and Aripa de Abaja, Tocuche, Trinidad. Type collected by Purdie (a collection by Crüger also is cited).

DISTRIBUTION: Trinidad.

TRINIDAD: *Purdie* 103 (K, type); *Fendler* 489 (K). Tocuche, *Crüger* 3 (K). Aripa, *Crüger* (G), 1009 (K); *Broadway* 5333 (K, Y). Valencia, *Britton, Britton, & Hazen* 1018 (G, N, Y); *Britton, Hazen, & Mendelson* 1814 (G, N, Y).

This species and the following constitute a very distinct section of *Orthaea*, marked by the truncate calyx limb and the solitary or paired flowers. *O. apophysata* is the type species of the genus *Findlaya*, characterized by Hoerold as having 15 stamens. This feature has not been observed in any specimens I have seen, and I do not consider the characters just mentioned as of generic worth. It may be noted that both these species are found in the hills of British Guiana and Trinidad, that the first two species treated in my key are found in northeastern Colombia, and that all the remaining species are found farther south in the Andes. This correlation of morphological charac-

ters with geographic distribution makes the genus an excellent example of regional evolution.

11. *Orthaea hispida* A. C. Smith, sp. nov.

Frutex gracilis ramosus; ramulis dense hispidopilosis; laminis ovatis basi rotundatis apice breve acuminatis subglabris pinnatinerviis; floribus solitariis vel binis; calyce dense constanterque hispidopiloso subcampanulato, limbo subtruncato; corolla glabra; staminibus alternatim inaequalibus, antheris aequalibus, tubulis loculos subaequantibus poris ovalibus obliquis dehiscentibus.

Slender branching shrub; branchlets terete, densely hispid-pilose with dark brown spreading hairs 1 to 2 mm. long; petioles subrugose, 2 to 3 mm. long, glabrous or sparsely hispid; leaf blades ovate, 5 to 7 cm. long, 3 to 4 cm. broad, rounded at base, obtusely short-acuminate at apex, entire at margins, glabrous or deciduously short-pilose on both surfaces, pinnate-veined, the midvein slightly impressed above, raised beneath, the secondary veins 2 or 3 to a side, spreading, plane above, slightly raised beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence axillary, 1 or 2 flowered; pedicels subrugose, 3 to 6 mm. long, hispid as the branchlets, bibracteolate at middle, the bractlets ovate, fimbriate, about 1 mm. long; calyx obscured by numerous spreading hairs 3 to 5 mm. long, the tube subcampanulate, 3 to 4 mm. long, about 3 mm. in diameter at anthesis, the limb suberect, 2 to 3 mm. long, subtruncate; corolla submembranous, glabrous, 13 to 16 mm. long, about 3 mm. in diameter, the lobes not observed; stamens about 6 mm. and 7 mm. long respectively; filaments dark castaneous, distinct, sparsely pilose distally, about 2.5 mm. and 4 mm. long, respectively; anther sacs slightly granular, about 2 mm. long; tubules erect, about 2 mm. long, opening by oblique oval pores 1 mm. long; stigma truncate.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected in British Guiana (probably in the sandstone region toward Mount Roraima), by R. Schomburgk (no. 35).

DISTRIBUTION: Known only from the type collection.

This species is undoubtedly related to the preceding, but is very distinct in its copiously hispid-pilose branchlets and calyces.

DOUBTFUL SPECIES

ORTHAEA ABBREVIATA Drake; Journ. de Bot. 3:75. 1889.

TYPE LOCALITY: Río de San Francisco, Ecuador. Type collected by Poortmann (no. 314).

I have not seen any specimens answering to the description of this species, which I take to be allied to *O. engleriana*.

19. *LYSICLESIA* A. C. Smith, gen. nov.

Calyx cum pedicello articulatus 3-alatus, limbo erecto 3-lobato, lobis submembranaceis lanceolato-triangularibus vel ovatis. Corolla subcylindrica 4 vel 5-lobata. Stamina 8 vel 10 alternatim inaequalia quam corolla triplo breviora, filamentis distinctis vel cohaerentibus alternatim inaequalibus, antheris submembranaceis aequalibus, tubulis loculos subaequantibus poris terminalibus dehiscentibus. Frutices parvi (epiphytici?), laminis alternis subcoriaceis petiolatis pli-nerviis. Flores solitarii in ramulis terminalibus dispositi.

Calyx tube articulate with pedicel, 3-winged (wings formed by bases of lobes); limb erect, 3-lobed, the lobes bractlike, submembranous, lanceolate-triangular or ovate; corolla subcylindric, 4 or 5 lobed, the lobes triangular, subacute; stamens 8 or 10, alternately unequal, about one-third as long as

corolla; filaments distinct or coherent at base, alternately unequal, attached to the anther dorsally near its base; anthers submembranous, equal, the sacs nearly smooth, the tubules about as long as the sacs, wide, opening by terminal irregular-edged pores; style filiform, about as long as corolla, the stigma truncate.

Low shrubs, probably epiphytic, with alternate pinnately-nerved petioled subcoriaceous leaves; flowers solitary on leafless terminal branchlets, the pedicels bibracteolate at base.

DISTRIBUTION: Andes of northwestern Colombia. Two species are known.

In structure of corolla and stamens this genus resembles *Orthaca*, from which it differs by its three large calyx lobes. *L. caudata* is designated as the type species.

Named after Lysicles, a Greek statesman at the time of the Peloponnesian War.

KEY TO THE SPECIES

- Leaves long-acuminate, 6 to 7 cm. long, 2.5 to 3 cm. broad; calyx lobes ovate, 12 mm. across near base; stamens 8 (always?), 6 mm. and 8 mm. long, respectively; filaments distinct or loosely coherent----- 1. *L. caudata*.
 Leaves acute or subacuminate, 2 to 3 cm. long, about 1 cm. broad; calyx lobes lanceolate-triangular, 10 mm. across near base; stamens 10, 8 mm. and 10 mm. long, respectively; filaments connate in lower half----- 2. *L. minor*.

1. *Lysiclesia caudata* A. C. Smith, sp. nov.

Frutex subscandens, generis characteribus; laminis ovatis basi cuneatis apice caudato-acuminatis obscure 5-nerviis; staminibus 8.

Subscandent shrub; branchlets terete, slender, brownish, glabrous; petioles subterete, subrugose, glabrous, 4 to 7 mm. long; leaf blades ovate, 6 to 7 cm. long, 2 to 3 cm. broad, cuneate at base, caudate-acuminate at apex (acumen 15 mm. long, about 3 mm. across base), entire and slightly thickened at margins, glabrous, obscurely 5-nerved, the midnerve plane or slightly impressed above, raised beneath, the secondary nerves oriented from base, slightly raised on both surfaces, the veinlets reticulate, nearly plane; flowers solitary on leafless terminal branches; rachis subterete, slender, sparsely and deciduously pilose; pedicels terete, 18 to 22 mm. long, each subtended by a lanceolate-triangular bractlet 3 mm. long, bibracteolate near base with ovate-acuminate bractlets about 4 mm. long, swollen distally; calyx tube obscured by wings formed by the lobes, about 4 mm. long and 4 mm. in diameter, exclusive of wings; limb erect, 3-parted, the lobes ovate, short-acuminate, 26 to 27 mm. long, slightly projected at base beyond base of tube, about 12 mm. across at broadest part, membranous, copiously longitudinally veined, nearly completely covering the corolla; corolla submembranous, about 35 mm. long, 6 mm. in diameter, contracted distally, white-tomentose distally with lax hairs about 0.5 mm. long, 4-lobed, the lobes 1.5 mm. long; stamens 8, about 6 mm. and 8 mm. long, respectively; filaments castaneous, membranous, distinct or loosely coherent at base, sparsely and laxly pilose distally, about 2.5 mm. and 4.5 mm. long, respectively; anther sacs nearly smooth, about 2.5 mm. long; tubules erect, wide, about 2.5 mm. long.

Type in the herbarium of the New York Botanical Garden, collected in forest above Cascada Chorrón, south of Antizales, Department of Bolívar, Colombia, altitude 2,400 to 2,800 meters, February 25, 1918, by F. W. Pennell (no. 4389).

DISTRIBUTION: Known only from the type collection.

EXPLANATION OF PLATE 18.—*Lysiclesia caudata*, from photograph of type sheet. About one-half natural size.

2. *Lysiclesia minor* A. C. Smith, sp. nov.

Frutex gracilis, generis characteribus; laminis ovato-oblongis basi rotundatis apice apiculatis obscure 5-nerviis; staminibus 10.

Slender shrub; branchlets terete, slender, cinereous, deciduously pilose with stiff hairs about 0.2 mm. long; petioles subterete, essentially glabrous, 1 to 2 mm. long; leaf blades ovate-oblong, 3 to 3.5 cm. long, 1 to 1.5 cm. broad, rounded at base, apiculate at apex, entire at margins, glabrous, obscurely 5-nerved, the midnerve slightly impressed above, raised beneath, the secondary nerves oriented from base, slightly raised on both surfaces, the veinlets reticulate, slightly raised on both surfaces; flowers solitary on leafless terminal branches; pedicels striate, 12 to 15 mm. long, sparsely pilose, bibracteolate near base with triangular bractlets about 2 mm. long; calyx tube obscured by wings formed by bases of lobes, about 4 mm. long and 3 mm. in diameter exclusive of wings; limb erect, 3-parted, the lobes lanceolate-triangular, acuminate, about 32 mm. long, 10 mm. across at broadest part, slightly projected beyond base of tube, membranous, sparsely fimbriate and slightly thickened at margins, copiously reticulate-veined (veins elevated on both surfaces), nearly completely covering the corolla; corolla 28 to 35 mm. long, about 5 mm. in diameter, contracted distally, sparsely white-tomentose distally, the lobes 5 (?); stamens 10, about 8 mm. and 10 mm. long, respectively; filaments castaneous, membranous, slightly coherent, sparsely and laxly pilose distally with hairs up to 0.8 mm. long, about 4.5 mm. and 6.5 mm. long, respectively; anther sacs smooth, about 2 mm. long; tubules erect, wide, about 3 mm. long.

Type in the U. S. National Herbarium, no. 938,520, collected south of Amalfi, Department of Antioquia, Colombia, altitude 2,000 meters, September, 1884, by F. C. Lehmann (no. 4086).

DISTRIBUTION: Known only from the type collection.

20. SATYRIA Klotzsch, *Linnaea* 24:21. 1851

(*Riedelia* Meissn. in Mart. Fl. Bras. 7:172. 1863)

Calyx tube articulate with pedicel; limb subspreading, 5-lobed (rarely 3 or 4 lobed), the lobes ovate or triangular; corolla subcylindric, 5-lobed, the lobes triangular; stamens 10, alternately unequal, shorter than corolla (frequently about one-third as long); filaments firmly connate in a tube, submembranous, attached to the anther dorsally near its base, equal; anthers subcoriaceous, firm, alternately unequal, the sacs slightly granular, the tubules not clearly differentiated from sacs, flaring, opening by broad lateral clefts; style filiform, about as long as corolla.

Low shrubs, frequently epiphytic, with alternate, pinnately-nerved or pinnate-veined, coriaceous, petioled leaves; inflorescence axillary or terminal, racemose or subfasciculate, few to many-flowered; flowers pedicelled, the pedicels bibracteolate.

DISTRIBUTION: Mountains from southern Mexico to Colombia, with a single species in Bolivia. Fourteen species are known.

This very distinct and unmistakable genus is marked by equal connate filaments and alternately unequal rigid anthers flaring at the apices. *S. warszewiczii* Klotzsch is the type species.

KEY TO THE SPECIES

Inflorescence elongate (rachis 1.5 to 4 cm. long).

Leaves elliptic-oblong, 3 to 6 cm. long, 1.2 to 1.8 cm. broad; base of anthers setose (Bolivia)----- 1. *S. neglecta*.

Leaves ovate to oblong, at least 7 cm. long and 2.5 cm. broad; base of anthers glabrous or subpuberulous (Mexico to Peru).

Leaf base narrowed and cuneate (Central America)----- 2. *S. elongata*.

Leaf base subcordate or rounded.

Calyx lobes 5, rarely 3 or 4 (South America)----- 3. *S. panurensis*.

Calyx lobes 3 (Costa Rica)----- 4. *S. triloba*.

Inflorescence short (flowers fascicled or short-racemose, the rachis rarely exceeding 1 cm. in length, sometimes up to 1.5 cm. long in no. 6).

Calyx densely pubescent, the hairs pale, spreading, about 0.3 mm. long; filament tube pilose at upper margin with hairs about 0.5 mm. long; leaf base subcordate or truncate (northwestern Colombia)----- 5. *S. pilosa*.

Calyx glabrous or minutely puberulous; filament tube glabrous or marginally short-pilose with hairs not more than 0.3 mm. long; leaf base cuneate.

Leaves ovate to obovate, twice as long as broad, not more than 10 cm. long (Central America)----- 6. *S. ovata*.

Leaves ovate to oblong, about 3 times as long as broad (except nos. 9 and 13), at least 10 cm. long.

Corolla 20 mm. long or more at maturity (rarely 18 mm. long).

Anthers subcoriaceous (Central America)----- 7. *S. warszewiczii*.

Anthers stiffly coriaceous (Colombia).

Leaves narrowly oblong, up to 20 cm. long and 7 cm. broad; filaments and anthers dorsally glabrous----- 8. *S. grandifolia*.

Leaves broadly oblong, up to 35 cm. long and 15 cm. broad; filaments and anthers dorsally puberulous----- 9. *S. latifolia*.

Corolla less than 17 mm. long at maturity.

Calyx puberulous.

Leaves 11 to 20 cm. long; corolla 10 to 12 mm. long (Guatemala).

10. *S. meiantha*.

Leaves 18 to 30 cm. long; corolla 12 to 14 mm. long (Venezuela).

11. *S. nitida*.

Calyx glabrous (Colombia).

Flowers small (long anthers slightly more than 2 mm. long; corolla 7 to 8 mm. long)----- 12. *S. minutiflora*.

Flowers larger (long anthers at least 4 mm. long; corolla more than 11 mm. long).

Leaves about twice as long as broad; flowers ample (calyx tube 4 mm. in diameter; corolla 5 mm. in diameter at base).

13. *S. toroi*.

Leaves about 3 times as long as broad; flowers slender (calyx tube 2 to 3 mm. in diameter; corolla 3 to 4 mm. in diameter at base)----- 14. *S. breviflora*.

1. *Satyria neglecta* A. C. Smith, sp. nov.

Frutex; laminis oblongis vel elliptico-oblongis parvis basi cuneatis apice acutis pinnatinerviis; inflorescentia breviter racemosa glabra; calycis campanulati limbo tubum subaequante, lobis apiculatis; corolla subcylindrica; filamentis connatis aequalibus, antheris basi setosis alternatim inaequalibus, tubulis rimis latis dehiscentibus.

Shrub; branchlets subterete, striate, glabrous, brownish; petioles subrugose, glabrous, 2 to 4 mm. long, narrowly winged above; leaf blades coriaceous, oblong or elliptic-oblong, 3 to 6 cm. long, 1.2 to 1.8 cm. broad, cuneate or subattenuate at base, acute at apex, entire and slightly revolute at margins, pinnate-veined, the midvein slightly impressed above, prominent beneath, the secondary veins 2 or 3 to a side, ascending, plane above, raised beneath, the veinlets reticulate, nearly plane on both surfaces; inflorescence axillary, short-racemose, 10 to 20 flowered, glabrous in all parts; rachis subterete, 1 to 2.5 cm. long; pedicels striate, 6 to 12 mm. long, bibracteolate below middle with lanceolate fimbriate bractlets about 1 mm. long, sparsely puberulous or glabrous; calyx tube short-cylindric, about 1 mm. long and 2 mm. in diameter at anthesis; limb suberect, 1 to 1.5 mm. long including lobes, the lobes 5, apiculate, about 0.5 mm. long; corolla thin-carnose, slightly rugose, glabrous, about 6 mm. long and 2.5 mm. in diameter, contracted at throat, the lobes flaring, somewhat reflexed, obtuse, about 1 mm. long; stamens about 4.5 mm. and 5 mm. long, respectively; filaments castaneous, equal, about 2.5 mm. long, minutely brown-pilose without distally; anther sacs slightly granular, setose at base with hairs about 0.4 mm. long, about 1 mm. and 1.5 mm. long, respectively; tubules about 1.5 mm. long, opening by introrse oval clefts nearly as long; stigma truncate; young fruit subspherical, coriaceous, up to 4 mm. in diameter.

Type in the herbarium of the New York Botanical Garden, collected at Mapiri, Department of La Paz, Bolivia, altitude about 775 meters, May, 1886, by H. H. Rusby (no. 2219).

DISTRIBUTION: Known only from the type specimen.

This is the only species of *Satyria* known from Bolivia; that it is remarkably distinct from all other species in its small leaves and setose-based anthers is in keeping with its isolated geographic position.

2. *Satyria elongata* A. C. Smith, sp. nov.

Frutex gracilis epiphyticus; laminis lanceolato-oblongis basi cuneatis apice longe acuminatis 3 ad 5 pli-nerviis; inflorescentia racemosa comparate elongata glabra; calyce minute puberulento campanulato, limbo quam tubo brevior; corolla cylindrica; filamentis connatis, antheris basi productis superne dilatatis rimis ovalibus dehiscentibus.

Slender epiphytic shrub; branchlets glabrous or sparsely puberulous when young, brownish or cinereous; petioles subrugose, essentially glabrous, 4 to 5 mm. long; leaf blades lanceolate-oblong, 12 to 17 cm. long, 3 to 4 cm. broad, cuneate at base, long-acuminate at apex, entire and slightly revolute at margins, glabrous, thick-coriaceous, 3 to 5 pli-nerved, the midnerve slightly raised above, prominent beneath, pinnate-veined (veins inconspicuous, spreading, 5 to 9 to a side, joining the second and third nerves), the secondary nerves oriented from base, ascending near margins, slightly raised on both surfaces, the veinlets reticulate, slightly raised; inflorescence axillary near ends of branchlets, racemose, 7 to 15 flowered; rachis angled, essentially glabrous, 2.5 to 5 cm. long, deciduously minutely bracteate at base; pedicels striate, 12 to 22 mm. long, glabrous, each subtended by a subcoriaceous ovate acute bract about 2.5 mm. long, deciduously bibracteolate near base with lanceolate-ovate puberulous bractlets about 1.5 mm. long, swollen distally; calyx tube coriaceous, minutely puberulous with pale hairs about 0.1 mm. long, broadly campanulate, 2 to 2.5 mm. long, about 3 mm. in diameter at anthesis; limb spreading, thin-coriaceous, about 1.5 mm. long including lobes, the lobes 5, ovate, apiculate, about 1 mm. long, slightly thickened at margins; corolla minutely puberulous as the calyx, 20 to 30 mm. long, about 4 mm. in diameter, contracted at throat, the lobes oblong, subacute, about 3 mm. long; stamens 6.5 to 10 mm. and 7.5

to 11 mm. long, respectively; filaments dark castaneous, faintly puberulous distally, 4 to 6 mm. long; anthers nearly smooth, slender and slightly produced at base, 4 to 5 mm. and 5 to 6 mm. long respectively, opening by wide oval pores 1 to 1.5 mm. long; stigma truncate; young fruit coriaceous, subspherical, purplish, up to 7 mm. in diameter, surmounted by the persistent calyx limb.

Type in the U. S. National Herbarium, no. 941,221, collected at Cubilquitz, Department of Alta Verapaz, Guatemala, altitude 350 meters, July, 1900, by H. von Tuerckheim (no. 7633). Duplicates at G, Y.

DISTRIBUTION: Southern Mexico to Costa Rica, altitude 300 to 1,600 meters. MEXICO.

OAXACA: Montebello, *Reko* 4027 (N).

GUATEMALA.

ALTA VERAPAZ: Chamá, *Johnson* 510 (N).

COSTA RICA: Tucurrique, *Tonduz* 13371 (N).

CARTAGO: Pejivalle, *Standley & Valerio* 46948 (N).

The specimens from Costa Rica appear conspecific with those from farther north, although the range thus indicated is unusual. Probably the species is more closely related to *S. warszewiczii* than is implied in the key, but it is nevertheless quite distinct on the basis of its elongate inflorescence.

3. *Satyria panurensis* (Benth.) Benth. & Hook. Gen. Pl. 2:568. 1876.

Thibaudia panurensis Benth.; Meissn. in Mart. Fl. Bras. 7:125. 1863.

Riedelia bahiensis Meissn. in Mart. Fl. Bras. 7:172. 1863.

Riedelia panurensis Kuntze, Rev. Gen. Pl. 2:384. 1891.

Satyria ulei Hoer. Verh. Bot. Ver. Brand. 50:93. 1909.

Shrub; branchlets terete, cinereous, glabrous; petioles rugose, glabrous, 4 to 6 mm. long; leaf blades oblong, 10 to 13 cm. long, 3 to 6 cm. broad, rounded or subcuneate or subcordate at base, acuminate at apex, entire at margins, glabrous, nitid, 3 to 5 pli-nerved, the secondary nerves oriented from base, spreading near margins, with the midnerve slightly raised above, prominent beneath, the veinlets reticulate, slightly raised along the midnerve, otherwise obscure; inflorescence axillary, racemose, 8 to 20 flowered, glabrous in all parts; rachis subterete, 1.5 to 4 cm. long; pedicles subrugose, 8 to 11 mm. long, bibracteolate near base with triangular, sparsely fimbriate bractlets about 1 mm. long, slightly swollen distally; calyx tube subcylindric, sparsely puberulous when young, about 2 mm. long and 2 mm. in diameter at anthesis; limb spreading, 1 to 2 mm. long including lobes, the lobes ovate, apiculate, 0.5 to 1 mm. long; corolla thin-carnose, glabrous or sparsely farinose at apex when young, 16 to 31 mm. long, about 3 mm. in diameter, the lobes erect, oblong, subacute, about 1.5 mm. long; stamens 7.5 to 10 mm. and 8.5 to 11 mm. long, respectively; filaments nigrescent, 4 to 6 mm. long, glabrous, produced into slender connectives, these minutely pilose with hairs up to 0.2 mm. long; anthers slender, dark castaneous, produced at base, 5 to 7 mm. and 6 to 8 mm. long respectively, flaring distally, opening by large oval clefts 1.5 to 2 mm. long; stigma truncate.

TYPE LOCALITY: Near Panure, Rio Uaupes, State of Amazonas, Brazil. Type collected by Spruce (no. 2704).

DISTRIBUTION: Foothills of the Andes, upper Amazon basin; also in western British Guiana; altitude up to 1,300 meters.

BRITISH GUIANA: Below Kaieteur Falls, Potaro River, *Jenman* 827 (K).

COLOMBIA.

CUNDINAMARCA: Pipiral to Susumuco, southeast of Quetamé, *Pennell* 1711 (N, Y).

PERU.

SAN MARTÍN: Cerro de Ponasa, *Ule* 6672 (B, type of *S. ulei*, Go).

LORETO: Mouth of Río Santiago, *Tessmann* 4662 (B). Timbuchi, Río Nanay, *L. Williams* 934 (F, Y). Manfinfa, upper Río Nanay, *L. Williams* 1108 (F, Y).

BRAZIL.

AMAZONAS: Panure, Rio Uaupes, *Spruce* 2704 (K, type, G). Rio Japura, *Martius* (type collection of *Riedelia bahiensis*, K, Y).

The above-cited specimens, in spite of their widely separated stations, seem to me conspecific. The differences are very slight and appear purely individual; for instance, the leaves of the Guiana specimen are slightly the broadest and the corollas somewhat longer. The three types involved show no consequential differences. The distribution parallels that of *Psammisia guianensis* and of many other plants of the foothills at the edge of the Amazon basin, and the species is probably to be found at many other points in this sparsely collected region. The application of the specific name "*bahiensis*" by Meissner was apparently due to a mistake in labels, but fortunately the name does not have to be retained.

4. *Satyria triloba* A. C. Smith, sp. nov.

Frutex gracilis epiphyticus; laminis ovatis vel oblongo-ovatis basi rotundatis apice acuminatis 5-plex-nerviis; inflorescentia racemosa; calyce campanulato rugoso minute puberulento, limbo tubum subaequante 3-lobato, lobis ovatis; corolla cylindrica; filamentis connatis aequalibus, antheris basi productis superne dilatatis.

Slender epiphytic shrub; branchlets terete, cinereous, glabrous; petioles rugose, sparsely puberulous or glabrous, 3 to 5 mm. long; leaf blades ovate or oblong-ovate, 7 to 10 cm. long, 3.5 to 4.5 cm. broad, rounded at base, acuminate at apex, entire and slightly thickened at margins, 5-plex-nerved, the midnerve slightly impressed above, prominent beneath, the secondary veins oriented near base, ascending near margins, plane above, slightly raised beneath, the veinlets reticulate, slightly raised beneath; inflorescence axillary, short-racemose, 6 to 12 flowered; rachis striate, 1.5 to 3 cm. long, minutely puberulous, becoming glabrous, circumscribed at base by several imbricate ovate subcoriaceous bractlets up to 2 mm. long; pedicels rugose, 8 to 12 mm. long, bibracteolate below middle with ovate-lanceolate short-fimbriate bractlets up to 2 mm. long, slightly swollen distally; calyx tube rugose, minutely puberulous, campanulate, about 2 mm. long and 2 mm. in diameter at anthesis; limb spreading, about 2 mm. long including lobes, the lobes 3, frequently reflexed, ovate, acute, about 2 mm. long, 2 to 3 mm. across; corolla thin-carnose, about 25 mm. long, 2.5 to 3 mm. in diameter, minutely puberulous, 5-lobed, the lobes oblong, subacute, about 1 mm. long; stamens about 8 mm. and 9 mm. long, respectively; filaments dark castaneous or nigrescent, glabrous, about 4 mm. long, leading into slender connectives, these sparsely puberulous; anthers dark castaneous, produced at base, about 5 mm. and 6 mm. long, respectively, opening by oval clefts about 1 mm. long; stigma truncate.

Type in the U. S. National Herbarium, no. 941,207, collected at "Fougeraies du General, vallée du Diquís," Costa Rica, altitude 700 meters, February 2, 1898, by H. Pittier (no. 12147).

DISTRIBUTION: Known only from the type specimen.

This species, which bears a strong superficial resemblance to the preceding, is distinct on the basis of its 3-lobed calyx, which here is a constant character.

5. *Satyria pilosa* A. C. Smith, sp. nov.

Frutex robustus; laminis oblongis vel obovato-oblongis basi truncatis vel leviter subcordatis apice acutis 7-*pli-nerviis*; inflorescentia subfasciculata ubique albo-pilosa; calycis rugosi campanulati limbo tubum subaequante, lobis apiculatis; corolla cylindrica; filamentis membranaceis connatis, antheris inaequalibus rimis ovalibus latis dehiscentibus.

Stout shrub; branchlets terete, cinereous, glabrous; petioles strongly rugose, glabrous, stout, up to 6 mm. long; leaf blades oblong or obovate-oblong, up to 18 cm. long and 7 cm. broad, truncate or slightly subcordate at base, acute at apex, entire and revolute at margins, glabrous, 7-*pli-nerved*, the secondary nerves oriented above base for a distance of 3 to 5 cm., sharply ascending, with the midnerve impressed above, strongly prominent beneath, the veinlets copiously reticulate, obscure above, nearly plane beneath; inflorescence axillary, subfasciculate; pedicels subterete, about 3 mm. long, pilose with spreading white hairs about 0.2 mm. long, bibracteolate near middle with ovate fimbriate bractlets about 1 mm. long, slightly swollen distally; calyx tube rugose, campanulate, densely white-pubescent with spreading hairs up to 0.3 mm. long, about 2.5 mm. long and 3 mm. in diameter at anthesis; limb erect, pubescent, 2 to 3 mm. long including lobes, the lobes 5, apiculate, about 0.5 mm. long; corolla laxly pilose, becoming glabrous proximally, 17 to 19 mm. long, 3 to 4 mm. in diameter, contracted distally, the lobes subacute, about 1.5 mm. long; stamens about 6 mm. and 6.5 mm. long, respectively; filaments castaneous, membranous, densely pilose at upper margins with hairs about 0.5 mm. long, about 3.5 mm. long; anthers dark castaneous, slightly incurved at base, about 3.7 mm. and 4.2 mm. long, respectively, opening by broad oval clefts about 1 mm. long.

Type in the herbarium of the New York Botanical Garden, collected in forest at Antizales, Department of Bolívar, Colombia, altitude 1,200 to 1,800 meters, February 25 or 26, 1918, by F. W. Pennell (no. 4421).

DISTRIBUTION: Known only from the type collection.

The present specimen is very imperfect, but is sufficiently complete to permit its recognition as a distinct species marked by the pubescent flowers and the marginally pubescent filament tube. Apparently the inflorescence is several flowered, the flowers spreading from a coriaceous peduncle on the larger branchlets.

6. *Satyria ovata* A. C. Smith, sp. nov.

Frutex epiphyticus; laminis ovatis basi cuneatis apice obtusis 3 ad 5-*pli-nerviis*; inflorescentia subfasciculata vel breviter racemosa; calycis rugosi campanulati limbo tubum subaequante 5-lobato, lobis apiculatis; corolla cylindrica; filamentis connatis, antheris inaequalibus rimis latis ovalibus dehiscentibus.

Epiphytic shrub about 1 meter high; branchlets terete, stout, cinereous, glabrous; petioles rugose, glabrous, 5 to 10 mm. long; leaf blades ovate, thick-coriaceous, 5 to 10 cm. long, 3 to 6 cm. broad, cuneate or subattenuate at base, obtuse at apex, entire and slightly thickened at margins, glabrous, 3 to 5 *pli-nerved*, the secondary nerves oriented near base, with the midnerve nearly plane above, raised beneath, the veinlets reticulate, plane above, plane or slightly raised beneath; inflorescence axillary, subfasciculate or short-racemose, 4 to 10 flowered; rachis angled, glabrous, 1 to 1.5 cm. long, deciduously minutely bracteate at base; pedicels rugose, glabrous, somewhat flexuose, 10 to 16 mm. long, each subtended by a subcoriaceous, ovate, sparsely fimbriate bract about

1.3 mm. long, deciduously bibracteolate below middle, slightly swollen distally; calyx tube rugose, glabrous or deciduously puberulous, campanulate, about 2 mm. long and 2.5 mm. in diameter at anthesis; limb spreading, about 1.5 mm. long including lobes, the lobes 5, triangular, apiculate, submembranous, less than 1 mm. long; corolla glabrous or minutely pilose when young, about 20 mm. long and 4 to 5 mm. in diameter, contracted distally, the lobes subacute, about 1.5 mm. long; stamens about 6.5 mm. and 7.5 mm. long, respectively; filaments dark castaneous, membranous, pilose at margins distally when young, becoming glabrous, about 3.5 mm. long; anthers about 3.5 mm. and 4.5 mm. long, respectively, opening by wide oval pores about 1.5 mm. long; stigma truncate.

Type in the U. S. National Herbarium, no. 44,897, collected in Nicaragua, 1853 to 1856, by C. Wright.

DISTRIBUTION: Guatemala to Costa Rica.

GUATEMALA: *Friedrichsthal* 3 (K).

COSTA RICA.

GUANACASTE: Quebrada Serena, southeast of Tilarán, *Standley & Valerio* 46262 (N).

The three specimens cited are certainly conspecific, the species being marked by the comparatively small broad leaves. The flower dimensions are taken from the type specimen. The Costa Rican specimen is identical in habit, but bears less mature flowers which are somewhat pubescent. The anthers are similar to those above described but the filaments are much shorter, forming a tube which is distinctly and regularly pilose at the apical margin.

7. *Satyria warszewiczii* Klotzsch, *Linnaea* 24:22. 1851.

Satyria clonantha Klotzsch, *Linnaea* 24:22. 1851.

Riedelia warszewiczii Kuntze, *Rev. Gen. Pl.* 2:384. 1891.

Riedelia clonantha Kuntze, *Rev. Gen. Pl.* 2:384. 1891.

Epiphytic shrub up to 4 meters high; branchlets subterete, stout, glabrous, brownish or cinereous; petioles rugose, dark brown, narrowly winged above, 8 to 16 mm. long; leaf blades oblong or ovate-oblong, 10 to 23 cm. long, 2 to 9 cm. broad, narrowly cuneate at base, acuminate at apex, entire and slightly revolute at margins, thick-coriaceous, glabrous (rarely pilose beneath with appressed brownish hairs about 0.25 mm. long), 3 to 5 pli-nerved, the secondary nerves oriented near base, with the midnerve slightly raised above, prominent beneath, the veinlets copiously reticulate, slightly raised on both surfaces or plane; inflorescence frequently copious, short-racemose, often borne in clusters on stout branchlets, deciduously bracteate at base, 8 to 30 flowered; rachis striate, glabrous, 5 to 10 mm. long; pedicels rugose, glabrous, 15 to 25 mm. long, each subtended by a submembranous oblong bractlet 3 to 4 mm. long, deciduously bibracteolate below base, swollen distally; calyx tube rugose, coriaceous, glabrous, broadly campanulate, sometimes apophysate, about 2 mm. long and 3 to 4 mm. in diameter at anthesis; limb thin-coriaceous, 2 to 3 mm. long, including lobes, the lobes triangular, apiculate, 1 mm. long or less; corolla thin-carnose, glabrous, 18 to 28 mm. long, 4 to 5 mm. in diameter, contracted at throat, the lobes subacute, about 1 mm. long; stamens 7 to 9 mm. and 8 to 11 mm. long, respectively; filaments castaneous, submembranous, 3 to 5 mm. long, free, distally and marginally pilose; anthers about 5 mm. and 6 mm. long respectively, opening by wide oval clefts 2 to 2.5 mm. long; stigma truncate; young fruit rugose, short-cylindric, up to 6 mm. in diameter.

TYPE LOCALITY: Volcán Barba, Costa Rica. Type collected by Warszewicz.

DISTRIBUTION: Southern Mexico to western Panama, altitude 1,000 to 2,400 meters.

The typical form, with consistently 3-nerved leaves, the blades oblong-lanceolate and 2 to 3 cm. broad, is represented by the following specimens:

COSTA RICA: Volcán Barba, *Warszewicz* (B, type). Cerro Jucosal, *Stork* 1111 (F).

HEREDIA: Yerba Buena, *Standley & Valerio* 49037 (N).

CARTAGO: Santa Clara de Cartago, *Maxon & Harvey* 8228 (N).

PANAMA: Veraguas, *Bridges*, in 1855 (K).

The common form, with 5 (sometimes 3) nerved leaves, the blades oblong and more than 3 cm. broad, is represented by the following specimens:

MEXICO.

CHIAPAS: Near Tumbala, *Nelson* 3328 (G, N).

GUATEMALA.

ALTA VERAPAZ: Finca Sepacuité, *Cook & Griggs* 475 (N).

COSTA RICA: *Endres* 232 (K). Cucaracha, *Lankester* 100 (K). Cañas Gordas, *Pittier* 11206 (N). San Jerónimo, *Wercklé* 11301 (N). Esmeralda, *Tonduz* 1881 (F, N). San Ramón, *Tonduz* 17836 (B, F, N). Agua Caliente, *Stork* 1050 (F).

ALAJUELA: Volcán Poás, *J. D. Smith* 6637 (N). Fraijanes, *Standley & Torres* 47431 (N), 47620 (N).

HEREDIA: Cerros de Zurquí, *Standley & Valerio* 50266 (N), 50648 (N).

SAN JOSÉ: La Palma, *Wercklé* 11605 (N); *Tonduz* 12438 (N); *Standley* 38108 (N). La Hondura, *Standley* 36201 (N), 37657 (N). El Copey, *Tonduz* 12232 (F, N, Y); *Standley* 42070 (N). Santa María de Dota, *Standley* 41647 (N), 42286 (N), 42978 (N); *Standley & Valerio* 43440 (N). Between Aserrí and Tarbaca, *Standley* 34194 (N). Las Nubes, *Standley* 38601 (N). Zurquí, *Standley & Valerio* 48148 (N).

CARTAGO: El Muñeco, south of Navarro, *Standley* 33496 (N). Pejivalle, *Standley & Valerio* 47120 (N). Carpintera, *Stork* 2064 (F).

PANAMA.

CHIRIQUÍ: El Boquete, *Seemann* 1172 (K); *Pittier* 3014 (F, N).

VERAGUAS: *Warszewicz* (B, type of *S. clonantha*).

In proposing the genus *Satyria*, Klotzsch describes two species, *warszewiczii* and *clonantha*, but comparison of his descriptions and study of a large series of material convinces me that the two specimens described are extremes of a very common and variable species. The name *warszewiczii* is here retained, although most specimens are closer to the type of *S. clonantha* than to that of *S. warszewiczii*. The above flower dimensions are near the average; frequently the anthers are up to 10 mm. in length. Local names are: "Colmillos," "muelas," "arrayán," "uva."

All the above-cited specimens are from Central America. Following are descriptions of two Colombian plants which I am not thoroughly convinced should be maintained as species distinct from *S. warszewiczii*. However, until further exploration of eastern Panama and northern Colombia gives us a more complete series of specimens, it seems best to recognize them.

8. *Satyria grandifolia* Hoer. Bot. Jahrb. Engler 42: 319. 1909.

Stout branching shrub; branchlets terete, brownish, glabrous; petioles rugose, subterete, stout, 9 to 12 mm. long; leaf blades oblong, 15 to 22 cm. long, 4.5 to 7 cm. broad, acute at base, subacute or short-acuminate at apex, entire and slightly revolute at margins, glabrous, thick-coriaceous, 5-plexi-nerved, the secondary nerves oriented slightly above base, with the midnerve slightly impressed above, prominent beneath, the veinlets reticulate, slightly raised on

both surfaces; inflorescence axillary, frequently on leafless branchlets, short-racemose, 6 to 10 flowered; rachises stout, 5 to 8 mm. long, solitary or in small clusters, glabrous; pedicels subrugose, glabrous, 10 to 16 mm. long, each subtended by a subcoriaceous, oblong, sparsely fimbriate bract about 3 mm. long, bibracteolate near base with smaller bractlets; calyx tube broadly campanulate, subrugose, glabrous, 1 to 1.5 mm. long, 3 mm. in diameter at anthesis; limb spreading, about 2 mm. long including lobes, the lobes broadly ovate, apiculate, about 1 mm. long and 3 to 4 mm. broad; corolla narrowly cylindric, 25 to 30 mm. long, about 3 mm. in diameter at anthesis, contracted distally, the lobes small; stamens 8 mm. and 9 mm. long, respectively; filaments subnigrescent, sparsely pilose at distal margins, about 3 mm. long; anthers 7 mm. and 8 mm. long, respectively, opening by broad oval clefts about 3 mm. long; stigma truncate.

TYPE LOCALITY: Cienegueta, Cordillera del Chocó, Intendencia of El Chocó, Colombia, altitude 2,100 meters. Type collected by Triana (no. 2694).

DISTRIBUTION: Known only from the type collection.

COLOMBIA.

EL CHOCÓ: Cienegueta, *Triana* 2694 (B, type, K).

This species is distinct from *S. warszewiczii* on the basis of its unusually rigid anthers.

9. *Satyria latifolia* A. C. Smith, sp. nov.

Frutex robustus; laminis late ovato-oblongis basi late cuneatis glabris 5-plinerviis; floribus subglabris; calycis lati campanulati limbo tubum subaequante, lobis apiculatis; corolla cylindrica; filamentis nigrescentibus connatis superne pilosis, antheris granulatis rigide coriaceis dorsaliter puberulis superne dilatatis rimis latis ovalibus dehiscentibus.

Shrub; branchlets stout, terete, cinereous, glabrous; petioles subrugose, stout, up to 5 mm. in diameter, 9 to 12 mm. long; leaf blades broadly ovate-oblong, 25 to 35 cm. long, 11 to 15 cm. broad, broadly cuneate at base, entire and narrowly revolute at margins, glabrous, nitid above, thick-coriaceous, 5-plinerved, the secondary nerves oriented near base, with the midnerve slightly raised above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence and pedicels lacking in our specimen; calyx tube glabrous, broadly campanulate or subspherical, about 2.5 mm. long and 4 mm. in diameter at anthesis; limb spreading, coriaceous, about 2.5 mm. long including lobes, the lobes 5, triangular, apiculate, about 1 mm. long; corolla subcoriaceous, glabrous, or minutely puberulous distally, about 25 mm. long and 5 to 6 mm. in diameter, contracted distally, the lobes subacute, about 2 mm. long; stamens about 7.5 mm. and 9.5 mm. long, respectively; filaments nigrescent, coriaceous, 3 to 3.5 mm. long, pilose dorsally near apex with minute brown hairs, marginally white-pubescent with pale hairs up to 0.15 mm. long; anthers granular, rigidly coriaceous, dorsally puberulous, produced at base, about 6.5 mm. and 8.5 mm. long, respectively, opening by wide oval clefts about 3 mm. long; stigma truncate.

Type in the herbarium of the New York Botanical Garden, collected in mossy forest, Boca Antizales, on Río Esmeralda, Department of Bolívar, Colombia, altitude 1,400 to 1,800 meters, February 26, 1918, by F. W. Pennell (no. 4484).

DISTRIBUTION: Known only from the type collection.

The specimen here described is very incomplete, but represents a distinct species on the basis of its large leaves and rigidly coriaceous puberulous anthers.

10. *Satyria melantha* Donn. Smith, Bot. Gaz. 47: 256. 1909.

Scandent shrub; branchlets stout, subterete, glabrous, cinereous; petioles rugose, glabrous, 2 to 4 mm. in diameter, 8 to 12 mm. long; leaf blades oblong or ovate-oblong, 12 to 18 cm. long, 4 to 9 cm. broad, cuneate at base, acuminate or long-acuminate at apex, entire and slightly revolute at margins, glabrous, thick-coriaceous, 5-plexi-nerved, the secondary nerves oriented above base, with the midnerve nearly plane above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence axillary, frequently on large leafless branches, short-racemose, 6 to 12 flowered; rachis striate, slender, glabrous, 5 to 10 mm. long, minutely and deciduously bracteate at base; pedicels rugose, glabrous or sparsely puberulous towards apex, slender, 6 to 10 mm. long, each subtended by an oblong, acute, subcoriaceous, sparsely fimbriate bract about 2 mm. long, bibracteolate near middle with similar, slightly smaller bractlets, swollen distally; calyx tube campanulate, subrugose, minutely puberulous, becoming glabrous, about 2 mm. long and 2 mm. in diameter at anthesis; limb about 1.5 mm. long including lobes, subcoriaceous, minutely puberulous, the lobes triangular, apiculate, about 0.5 mm. long; corolla subrugose, glabrous, 10 to 11 mm. long, about 2.5 mm. in diameter, contracted distally, the lobes subacute, about 1 mm. long; stamens about 5 mm. and 5.5 mm. long, respectively; filaments castaneous, glabrous or sparsely puberulous distally, about 3 mm. long; anthers about 3 mm. and 3.5 mm. long, respectively, opening by broad oval clefts 1 to 1.3 mm. long; stigma truncate.

TYPE LOCALITY: Cobán, Department of Alta Verapaz, Guatemala, altitude 1,600 meters. Type collected by von Tuerckheim (no. II. 2101).

DISTRIBUTION: Department of Alta Verapaz, Guatemala, altitude 1,400 to 1,600 meters.

GUATEMALA.

ALTA VERAPAZ: Cobán, *von Tuerckheim* II. 2101 (G, N, type, Y). Samac, *Johnson* 873 (N).

The small flowers, puberulous calyces, and medium-sized leaves distinguish this species.

11. *Satyria nitida* A. C. Smith, sp. nov.

Riedelia fendleriana Kuntze, Rev. Gen. Pl. 2: 384. 1891, nomen.

Frutex scandens; laminis oblongis basi cuneatis apice acuminatis supra nitidis 5-plexi-nerviis; inflorescentia breviter racemosa ubique minute et decidue puberulento; calycis rugosi campanulati limbo tubum subaequante, lobis apiculatis; corolla cylindrica; filamentis connatis, antheris superne dilatatis rimis ovalibus dehiscentibus.

Scandent shrub; branchlets terete, glabrous, brownish; petioles rugose, stout, about 4 mm. in diameter, 6 to 10 mm. long, narrowly winged above; leaf blades oblong, 17 to 28 cm. long, 5 to 9 cm. broad, cuneate at base, acuminate or long-acuminate at apex, entire and narrowly revolute at margins, thick-coriaceous, glabrous and nitid above, glabrous beneath or sparsely pilose with scattered appressed brown hairs about 0.2 mm. long, 5-plexi-nerved, the secondary nerves oriented slightly above base, ascending nearly to apex, with the midnerve slightly raised above, prominent beneath, the veinlets reticulate, plane or slightly raised on both surfaces; inflorescence axillary, frequently on stout leafless branchlets, 5 to 8 flowered, short-racemose; racemes 2 to 4 in a group, giving to the inflorescence a paniced appearance; rachis striate, minutely puberulous when young, 3 to 5 mm. long, deciduously and minutely bracteate at base; pedicels striate, minutely puberulous, each subtended by an ovate-oblong subcoriaceous fimbriate bract about 1 mm. long, minutely bibracteolate below middle, swollen distally; calyx tube rugose, minutely puberulous with

hairs about 0.1 mm. long, campanulate, about 2 mm. long and 2 mm. in diameter at anthesis; limb spreading, about 1.5 mm. long including lobes, the lobes 5, apiculate, about 0.5 mm. long; corolla minutely puberulous as the calyx, 12 to 14 mm. long, about 3.5 mm. in diameter, slightly contracted above, the lobes oblong, subacute, about 1.5 mm. long; stamens about 5.5 mm. and 6 mm. long, respectively; filaments nigrescent, about 2.5 mm. long, leading into slender, laterally pilose connectives; anthers slightly incurved and inconspicuously setose at base, about 3.5 mm. and 4 mm. long, respectively, opening by broad introrse clefts 1 to 2 mm. long; stigma truncate.

Type in the Gray Herbarium of Harvard University, collected between Maracai and Choroní, near Colonia Tovar, State of Aragua, Venezuela, altitude about 1,550 meters, January 29, 1857, by A. Fendler (no. 2013). Duplicate at K.

DISTRIBUTION: Known only from the type collection.

The present species of *Satyria*, which is the only one known as yet from Venezuela, differs from the preceding by its larger leaves and flowers. They have in common a minutely puberulous calyx.

12. *Satyria minutiflora* A. C. Smith, sp. nov.

Frutex; laminis oblongis vel ovato-oblongis basi cuneatis supra nitidis 5-plinerviis; inflorescentia subfasciculata glabra; floribus minutis; calyce coriaceo rugoso campanulato, limbo tubum subaequante, lobis apiculatis; corolla elongato-urceolata; filamentis connatis, antheris inaequalibus superne dilatatis poris obliquis latis dehiscentibus.

Shrub; branchlets stout, subterete, sparsely puberulous with pale spreading hairs or glabrous, cinereous; petioles subrugose, stout, about 4 mm. long, essentially glabrous, 8 to 10 mm. long; leaf blades oblong or ovate-oblong, 16 to 20 cm. long, 5 to 7 cm. broad, broadly cuneate at base, acute at apex (?), entire and slightly recurved at margins, thick-coriaceous, glabrous and nitid above, glabrous or sparsely pilose beneath with appressed brownish hairs up to 0.3 mm. long, 5-pli-nerved, the secondary nerves oriented above base, ascending nearly to apex, with the midnerve nearly plane above, prominent beneath, the veinlets obscurely reticulate; inflorescence subfasciculate, the peduncles stout, borne in clusters on leafless branchlets, the flowers 3 to 6 to a peduncle, glabrous in all parts; pedicels striate, slender, 6 to 8 mm. long, each subtended by an oblong, sparsely fimbriate bract about 1 mm. long, similarly bibracteolate below middle, swollen distally; calyx tube coriaceous, rugose, campanulate or subglobose, about 1.5 mm. long and 2 mm. in diameter at anthesis; limb subcoriaceous, 1 to 1.5 mm. long including lobes, the lobes 5, apiculate, about 0.5 mm. long; corolla subrugose, elongate-urceolate, 7 to 8 mm. long, about 2.5 mm. in diameter, contracted at throat, the lobes spreading, subacute, about 1 mm. long; stamens about 2.5 mm. and 2.8 mm. long, respectively; filaments castaneous, sparsely pubescent distally, 1 mm. long or slightly less; anthers pale castaneous, about 1.9 mm. and 2.2 mm. long, respectively, opening by broad oblique pores about 0.6 mm. long; stigma capitate.

Type in the herbarium of the New York Botanical Garden, collected in forest at La Cumbre, Western Cordillera, Department of El Valle, Colombia, altitude 1,700 to 2,100 meters, September 9, 1922, by E. P. Killip and T. E. Hazen (no. 12138).

DISTRIBUTION: Known only from the type collection.

The small flowers and minute anthers easily distinguish this species. The extraordinarily stout branchlets, which bear flowers on the old woody portions, also are characteristic.

EXPLANATION OF PLATE 19.—*Satyria minutiflora*, from photograph of type sheet. About one-half natural size.

13. *Satyria toroi* A. C. Smith, sp. nov.

Frutex; laminis late ovato-oblongis basi cuneatis glabris 5-pli-nerviis; inflorescentia breviter racemosa; calycis tubo late campanulato rugoso glabro limbum subaequante, lobis ovato-apiculatis; corolla subcylindrica; filamentis connatis, antheris superne dilatatis rimis ovalibus latis dehiscentibus.

Shrub; branchlets stout, subterete, glabrous, cinereous; petioles subrugose, stout, 3 to 5 mm. in diameter, glabrous, 7 to 10 mm. long; leaf blades broadly ovate-oblong, 15 to 20 cm. long, 8 to 10 cm. broad, cuneate at base, apex (?), entire at margins, thick-coriaceous, glabrous, 5-pli-nerved, the secondary nerves oriented slightly above base, ascending near margins, with the midnerve nearly plane above, prominent beneath, the veinlets reticulate, slightly raised on both surfaces; inflorescence short-racemose, the racemes borne in clusters of 2 or 3 on stout leafless branchlets, deciduously bracteate at base, 5 to 10 flowered; rachis striate, 3 to 6 mm. long, glabrous; pedicels rugose, glabrous, 15 to 25 mm. long, each subtended by an oblong subcoriaceous fimbriate bract 3 to 4 mm. long, bibracteolate below middle with bractlets about 1.5 mm. long, swollen distally; calyx tube coriaceous, rugose, broadly campanulate, about 2 mm. long and 4 mm. in diameter at anthesis, glabrous; limb spreading, thin-coriaceous, about 3 mm. long including lobes, the lobes 5, ovate, apiculate, about 1.5 mm. long, thick-margined except at apex; corolla thin-carnose, minutely puberulous, becoming glabrous, subcylindric or elongate-urceolate, 15 to 17 mm. long, 4 to 5 mm. in diameter, contracted at throat, the lobes subacute, about 1.5 mm. long; stamens about 7 mm. and 8 mm. long respectively; filaments castaneous, about 2.5 mm. long, free distally and here puberulous; anthers castaneous, incurved at base, about 5.5 mm. and 6.5 mm. long, respectively, opening by wide oval clefts about 2.5 mm. long; stigma truncate.

Type in the herbarium of the New York Botanical Garden, collected at Dauro, Intendencia of El Chocó, Columbia, April 6, 1928, by R. A. Toro (no. 1131).

DISTRIBUTION: Known only from the type collection.

Distinguished by its broad leaves and ample soft-carnose flowers.

14. *Satyria breviflora* Hoer. Bot. Jahrb. Engler 42:319. 1909.

Shrub; branchlets stout, terete, glabrous, brownish or cinereous; petioles rugose, glabrous, stout, 3 to 4 mm. in diameter, narrowly winged above, 6 to 8 mm. long; leaf blades thick-coriaceous, ovate-oblong, 15 to 18 cm. long, 4 to 7 cm. broad, cuneate at base, acute at apex, entire and slightly revolute at margins, glabrous, 5-pli-nerved, the secondary nerves oriented slightly above base, with the midnerve impressed above, prominent beneath, the veinlets reticulate, plane or slightly raised; inflorescence short-racemose, the racemes solitary or clustered on stout leafless branchlets, deciduously minutely bracteate at base, 8 to 20 flowered; rachis stout, glabrous, 4 to 10 mm. long; pedicels rugose, glabrous, 20 to 25 mm. long, each subtended by a submembranous oblong acute fimbriate bract about 2.5 mm. long, bibracteolate below middle with bractlets about 1.5 mm. long, swollen distally; calyx tube coriaceous, rugose, campanulate, about 2 mm. long and 3 mm. in diameter at anthesis, glabrous; limb thin-coriaceous, about 2.5 mm. long including lobes, the lobes ovate, apiculate, about 1.5 mm. long, slightly thickened at margins except at apex; corolla thin-carnose, minutely puberulous when young, 11 to 16 mm. long, about 4 mm. in diameter, contracted at throat, the lobes subacute, less than 1 mm. long; stamens about 7.5 mm. and 8 mm. long, respectively; filaments dark castaneous, about 3 mm. long, pilose at margins distally with hairs about 0.2 mm. long;

anthers about 5.5 mm. and 6 mm. long, respectively, opening by wide clefts about 2 mm. long; stigma truncate.

TYPE LOCALITY: Quindío Region, Colombia (Department of Tolima?). Type collected by Triana (no. 253).

DISTRIBUTION: Andes of Central Colombia, altitude 2,000 to 2,300 meters.

COLOMBIA.

CUNDINAMARCA: Above Sibaté, *Holton*, in December, 1852 (Y).

TOLIMA: Quindío Region, *Triana* 253 (B, type). Murillo, *Pennell* 3191 (Y).

ANTIOQUIA: Medellín, *Archer* 1508 (N, Y).

CALDAS: Buenos Aires, north of Supía, *Pennell* 10725 (Y).

The above dimensions are average; the anthers of the *Holton* specimen are somewhat smaller, but it is apparently conspecific with material from the Central Cordillera.

LIST OF NEW SPECIES, NEW GENERA, AND NEW NAMES

	Page
Anthopterus bracteatus A. C. Smith, sp. nov.....	409
Anthopterus cuneatus A. C. Smith, sp. nov.....	407
Cavendishia axillaris A. C. Smith, sp. nov.....	493
Cavendishia bomareoides A. C. Smith, sp. nov.....	470
Cavendishia bullata Smith & Standl., sp. nov.....	453
Cavendishia caudata A. C. Smith, sp. nov.....	496
Cavendishia compacta A. C. Smith, sp. nov.....	468
Cavendishia divaricata A. C. Smith, sp. nov.....	481
Cavendishia durifolia A. C. Smith, sp. nov.....	493
Cavendishia glandulosa A. C. Smith, sp. nov.....	497
Cavendishia gracilis A. C. Smith, sp. nov.....	501
Cavendishia hispida A. C. Smith, sp. nov.....	469
Cavendishia killipii A. C. Smith, sp. nov.....	483
Cavendishia macrocephala A. C. Smith, sp. nov.....	475
Cavendishia marginata A. C. Smith, sp. nov.....	499
Cavendishia miconioides A. C. Smith.....	503
<i>Thibaudia melastomoides</i> H. B. K. Not <i>Cavendishia melastomoides</i> Hemsl.	
Cavendishia montana A. C. Smith, sp. nov.....	492
Cavendishia obtusa A. C. Smith, sp. nov.....	498
Cavendishia oligantha A. C. Smith, sp. nov.....	496
Cavendishia pterocarpa (Donn. Smith) A. C. Smith.....	449
<i>Themistoclesia pterocarpa</i> Donn. Smith.	
Cavendishia purdiei A. C. Smith, sp. nov.....	472
Cavendishia quercina A. C. Smith, sp. nov.....	450
Cavendishia rigidifolia A. C. Smith, sp. nov.....	500
Cavendishia sessiliflora A. C. Smith, sp. nov.....	483
Cavendishia spicata A. C. Smith, sp. nov.....	479
Cavendishia splachnoides A. C. Smith, sp. nov.....	471
Cavendishia subamplexicaulis A. C. Smith, sp. nov.....	478
Cavendishia venosa A. C. Smith, sp. nov.....	474
Ceratostema lobbii A. C. Smith, sp. nov.....	337
Englerodoxa calycina (Benth. & Hook.) A. C. Smith, sp. nov.....	351
<i>Ceratostema calycinum</i> Benth. & Hook., nomen.	
Englerodoxa loranthiflora (Benth.) A. C. Smith.....	352
<i>Ceratostema loranthiflorum</i> Benth.	
Gonocalyx portoricensis (Urban) A. C. Smith.....	354
<i>Thibaudia portoricensis</i> Urban.	
Gonocalyx smilacifolius (Griseb.) A. C. Smith.....	354
<i>Vaccinium smilacifolium</i> Griseb.	
Lateropora A. C. Smith, gen. nov.....	333
Lateropora ovata A. C. Smith, sp. nov.....	334
Lysiclesia A. C. Smith, gen. nov.....	517
Lysiclesia caudata A. C. Smith, sp. nov.....	518
Lysiclesia minor A. C. Smith, sp. nov.....	519
Macleania amplexicaulis A. C. Smith, sp. nov.....	367
Macleania compacta A. C. Smith, sp. nov.....	369
Macleania crassa A. C. Smith, sp. nov.....	373
Macleania hirtiflora (Benth.) A. C. Smith.....	382
<i>Thibaudia hirtiflora</i> Benth.	

	Page
Macleania linearifolia (Donn. Smith) A. C. Smith.....	368
<i>Macleania cordata</i> Lem. var. <i>linearifolia</i> Donn. Smith.	
Macleania nervosa A. C. Smith, sp. nov.....	380
Macleania reducta A. C. Smith, sp. nov.....	380
Macleania stricta A. C. Smith, sp. nov.....	364
Orthaea apophysata (Griseb.) A. C. Smith.....	516
<i>Sophoclesia apophysata</i> Griseb.	
Orthaea breviflora A. C. Smith, sp. nov.....	513
Orthaea cavendishioides A. C. Smith, sp. nov.....	511
Orthaea constans A. C. Smith, sp. nov.....	512
Orthaea hispida A. C. Smith, sp. nov.....	517
Periclesia A. C. Smith, gen. nov.....	357
Periclesia flexuosa A. C. Smith, sp. nov.....	357
Psammisia coarctata (R. & P.) A. C. Smith.....	401
<i>Thibaudia coarctata</i> R. & P.	
Psammisia elliptica (Rusby) A. C. Smith.....	395
<i>Macleania elliptica</i> Rusby.	
Psammisia ferruginea A. C. Smith, sp. nov.....	391
Psammisia globosa A. C. Smith, sp. nov.....	388
Psammisia killipii A. C. Smith, sp. nov.....	395
Psammisia pauciflora Griseb., sp. nov.....	394
Psammisia pennellii A. C. Smith, sp. nov.....	386
Psammisia urichiana (Britton) A. C. Smith.....	393
<i>Cavendishia urichiana</i> Britton.	
Satyria elongata A. C. Smith, sp. nov.....	521
Satyria latifolia A. C. Smith, sp. nov.....	527
Satyria minutiflora A. C. Smith, sp. nov.....	529
Satyria neglecta A. C. Smith, sp. nov.....	520
Satyria nitida A. C. Smith, sp. nov.....	528
Satyria ovata A. C. Smith, sp. nov.....	524
Satyria pilosa A. C. Smith, sp. nov.....	524
Satyria toroi A. C. Smith, sp. nov.....	530
Satyria triloba A. C. Smith, sp. nov.....	523
Siphonandra pilosa A. C. Smith, sp. nov.....	355
Themistoclesia compacta A. C. Smith, sp. nov.....	444
Themistoclesia dependens (Benth.) A. C. Smith.....	442
<i>Thibaudia dependens</i> Benth.	
Themistoclesia hirsuta A. C. Smith, sp. nov.....	443
Themistoclesia peruviana A. C. Smith, sp. nov.....	442
Themistoclesia vegasana A. C. Smith, sp. nov.....	440
Thibaudia andrei A. C. Smith, sp. nov.....	418
Thibaudia anomala A. C. Smith, sp. nov.....	429
Thibaudia archeri A. C. Smith, sp. nov.....	426
Thibaudia axillaris Rusby, sp. nov.....	417
Thibaudia herrerae A. C. Smith, sp. nov.....	435
Thibaudia laxa A. C. Smith, sp. nov.....	424
Thibaudia obovata A. C. Smith, sp. nov.....	431
Thibaudia ovalifolia A. C. Smith, sp. nov.....	434
Thibaudia pachyantha A. C. Smith, sp. nov.....	415
Thibaudia paniculata A. C. Smith, sp. nov.....	426
Thibaudia pennellii A. C. Smith, sp. nov.....	427
Thibaudia regularis A. C. Smith, sp. nov.....	436
Thibaudia rigidiflora A. C. Smith, sp. nov.....	418
Thibaudia spathulata A. C. Smith, sp. nov.....	434

INDEX TO NUMBERED SPECIMENS

The following list includes the numbered specimens studied.

ALFARO, A.

5843. *Cavendishia complectens*.

ALLART, A.

304. *Themistoclesia pendula*.

384. *Cavendishia splendens*.

399. *Psammisia hookeriana*.

ANDRÉ, E.

269. *Anthopterus wardii*.

577. *Psammisia lehmannii*.

754. *Macleania nitida*.

828. *Cavendishia cordifolia*.

985. *Psammisia pauciflora*.

1045. *Psammisia ecuadorensis*.

1337. *Psammisia lanceolata*.

1340. *Psammisia lanceolata*.

With 1340. *Thibaudia andrei*.

1498. *Psammisia lanceolata*.

1926. *Thibaudia floribunda*.

2070. *Psammisia ecuadorensis*.

2255. *Cavendishia macrocephala*.

3002. *Cavendishia cordifolia*.

3004. *Cavendishia acuminata*.

3028. *Psammisia graebneriana*.

With 3028. *Thibaudia andrei*.

3297. *Macleania stricta*.

3333. *Psammisia sodiroi*.

3341. *Psammisia ferruginea*.

3344. *Macleania nitida*.

3430. *Cavendishia venosa*.

3458. *Cavendishia gilgiana*.

3475. *Cavendishia cordifolia*.

3718. *Psammisia ecuadorensis*.

3793. *Psammisia sodiroi*.

3797. *Thibaudia floribunda*.

3841. *Cavendishia gilgiana*.

4340. *Macleania salapa*.

4553. *Macleania poortmanni*.

4561. *Semiramisia weberbaueri*.

4567. *Semiramisia weberbaueri*.

K1335. *Anthopterus wardii*.

ANTHONY, H. E., and TATE, G. H. H.

210. *Cavendishia acuminata*.

ARCHER, W. A.

176. *Cavendishia pubescens*.

202. *Psammisia lehmannii*.

316. *Cavendishia pubescens*.

1211. *Macleania nitida*.

1289a. *Cavendishia guatapeensis*.

1363. *Cavendishia pubescens*.

1508. *Satyria breviflora*.

1592. *Cavendishia pubescens*.

1901. *Anthopterus wardii*.

2002. *Psammisia breviflora*.

2013. *Thibaudia archeri*.

2209. *Psammisia breviflora*.

ARISTE JOSEPH, BROTHER

B. 112. *Ceratostema parvifolium*.

B. 113. *Psammisia falcata*.

BAILEY, L. H., and BAILEY, E. Z.

992. *Cavendishia pubescens*.

BANG, M.

290. *Cavendishia pubescens*.

624. *Rusbya taxifolia*.

721. *Cavendishia paniculata*.

1383. *Cavendishia pubescens boliviensis*.

1516. *Psammisia pauciflora*.

1939. *Ceratostema mandoni*.

2003. *Siphonandra elliptica*.

2373. *Cavendishia acuminata*.

2605. *Ceratostema spectabile*.

BOTTERI, M.

614. *Macleania insignis*.

BOYNTON, K.

8216. *Gonocalyx portoricensis*.

BRADE, A. C.

51. *Cavendishia longiflora*.
 2090. *Cavendishia quercina*.
 2101. *Cavendishia endresii*.
 2102. *Cavendishia veraguensis*.
 2354. *Cavendishia costaricensis*.
 16333. *Cavendishia smithii*.
 16672. *Cavendishia complectens*.

BRITTON, N. L., BRITTON, E. G., and

HAZEN, T. E.

1018. *Orthaea apophysata*.

BRITTON, N. L., and BRUNER, E. M.

7618. *Gonocalyx portoricensis*.

BRITTON, N. L., and FREEMAN, W. G.

2364. *Psammisia urichiana*.

BRITTON, N. L., HAZEN, T. E., and
 MENDELSON, W.

1294. *Psammisia recurvata*.
 1814. *Orthaea apophysata*.

BROADWAY, W. E.

5333. *Orthaea apophysata*.
 6211. *Psammisia recurvata*.
 7121. *Psammisia recurvata*.

BUCHTIEN, O.

30. *Thibaudia macrocalyx*.
 31. *Ceratostema graebnerianum*.
 503. *Cavendishia pubescens*.
 715. *Cavendishia pubescens*.
 910. *Thibaudia macrocalyx*.
 911. *Ceratostema graebnerianum*.
 1178. *Psammisia pauciflora*.
 1179. *Psammisia guyanensis*.
 1180. *Psammisia guyanensis*.
 1181. *Psammisia guyanensis*.
 2013. *Psammisia pauciflora*.
 2979. *Ceratostema spectabile*.
 2981. *Cavendishia beckmanniana*.
 3870. *Cavendishia pubescens*.
 5514. *Psammisia pauciflora*.
 5517. *Orthaea boliviensis*.
 5518. *Orthaea boliviensis*.
 7431. *Psammisia pauciflora*.
 7432. *Orthaea boliviensis*.
 7433. *Thibaudia boliviensis*.
 7612. *Cavendishia paniculata*.

BUES, C.

2114. *Ceratostema mandoni*.

CONZATTI, C.

167. *Macleania insignis*.

COOK, O. F., and GILBERT, G. B.

833. *Cavendishia beckmanniana*.
 862. *Cavendishia paniculata*.
 879. *Cavendishia beckmanniana*.
 1310. *Ceratostema graebnerianum*.

COOK, O. F., and GRIGGS, R. F.

99. *Cavendishia laurifolia*.
 129. *Cavendishia laurifolia*.
 418. *Cavendishia callista*.
 435. *Macleania insignis*.
 617. *Cavendishia callista*.
 3328. *Satyria warszewiczii*.

COOPER, J. J.

5842. *Psammisia ramiflora*.

CRÜGER, H.

3. *Orthaea apophysata*.
 1009. *Orthaea apophysata*.
 1709. *Psammisia recurvata*.

CURRAN, H. M., and HAMAN, M.

1118. *Cavendishia pubescens*.

DAWE, M. T.

316. *Thibaudia floribunda*.
 338. *Cavendishia cordifolia*.
 846. *Cavendishia adenophora*.
 849. *Cavendishia adenophora*.

DOMBEY, J.

431. *Cavendishia punctatifolia*.

DUCKE, A.

12275. *Thibaudia cupatensis*.

EGGERS, H. F. A.

1038. *Gonocalyx smilacifolius*.

EHRENBERG, C.

630. *Cavendishia laurifolia*.

ENDRES, A. R.

173. *Cavendishia endresii*.
 232. *Satyria warszewiczii*.

FENDLER, A.

489. *Orthaea apophysata*.
 733. *Themistoclesia pendula*.
 736. *Cavendishia splendens*.
 737. *Psammisia hookeriana*.
 738. *Cavendishia pubescens*.
 2013. *Satyria nitida*.

FIRMIN, G.

172. *Cavendishia acuminata*.
 320. *Cavendishia acuminata*.

FRIEDRICHSTHAL, E.

3. *Satyria ovata*.

FUNCK, N.

487. *Cavendishia scabriuscula*.
 488. *Macleania hirtiflora*.

GALEOTTI, H.

1814. *Macleania insignis*.
 1827. *Macleania insignis*.
 1840. *Macleania insignis*.

GEHRIGER, W.

275. *Cavendishia cordifolia*.
 324. *Macleania nitida*.
 405. *Cavendishia splendens*.
 583. *Cavendishia splendens*.
 612. *Themistoclesia pendula*.

GHIESBREGHT, A. B.

645. *Cavendishia crassifolia*.

GLEASON, H. A., and COOK, M. T.

- M186. *Gonocalyx portoricensis*.

GOLDMAN, E. A.

1870. *Psammisia ramiflora*.

GOLL, G. P.

211. *Cavendishia crassifolia*.
 213. *Cavendishia laurifolia*.

HARTWEG, C. T.

477. *Cavendishia crassifolia*.
 783. *Oreanthes buxifolius*.
 784. *Macleania salapa*.
 785. *Semiramisia speciosa*.
 786. *Macleania benthamiana*.
 786*. *Cavendishia capitata*.

787. *Englerodoxa loranthiflora*.
 788. *Ceratostema lanceolatum*.
 789. *Cavendishia hartwegiana*.
 1208. *Thibaudia parvifolia*.
 1209. *Themistoclesia dependens*.
 1216. *Psammisia macrophylla*.
 1217. *Thibaudia floribunda*.
 1218. *Macleania cordifolia*.
 1219. *Cavendishia acuminata*.
 1220. *Cavendishia pseudopubescens*.
 1221. *Cavendishia quereme*.
 1222. *Macleania pubiflora*.
 1223. *Macleania hirtiflora*.
 1224. *Thibaudia floribunda*.
 1225. *Thibaudia floribunda*.
 1225*. *Psammisia breviflora*.

HELLER, E.

2186. *Ceratostema mandoni*.
 2190. *Siphonandra elliptica*.

HERRERA, F. L.

1384. *Thibaudia herrerae*.
 1562. *Cavendishia beckmanniana*.
 2004. *Thibaudia regularis*.

HERZOG, T.

1639. *Cavendishia sillarensis*.
 2147. *Ceratostema mandoni*.

HEYDE, E. T., and LUX, E.

3184. *Cavendishia guatemalensis*.
 4532. *Cavendishia guatemalensis*.

HITCHCOCK, A. S.

20879. *Cavendishia acuminata*.
 21166. *Psammisia ecuadorensis*.
 21194. *Psammisia ulbrichiana*.
 21438. *Englerodoxa loranthiflora*.
 21623. *Macleania nitida*.

HOFFMANN, C.

53. *Cavendishia smithii*.
 141. *Cavendishia hoffmannii*.
 555. *Macleania glabra*.

HOLT, E. G., and BLAKE, E. R.

489. *Cavendishia duida*.
 499. *Thibaudia nutans*.
 708. *Cavendishia duida*.

HOLTON, I.

- 630. *Cavendishia cordifolia*.
- 631. *Cavendishia obtusa*.
- 632. *Thibaudia floribunda*.
- 633. *Psammisia falcata*.
- 634. *Cavendishia pubescens*.

JAHN, A.

- 199. *Cavendishia splendens*.
- 204. *Themistoclesia pendula*.
- 424. *Thibaudia jahnii*.
- 745. *Cavendishia splendens*.
- 985. *Psammisia penduliflora*.
- 997. *Cavendishia cordifolia*.
- 1201a. *Psammisia urichiana*.
- 1311. *Cavendishia splendens*.

JAMESON, W.

- 82. *Macleania punctata*.
- 166. *Cavendishia acuminata*.
- 226. *Cavendishia acuminata*.
- 290. *Cavendishia acuminata*.
- 293. *Thibaudia floribunda*.
- 321. *Cavendishia acuminata*.
- 384. *Macleania macrantha*.
- 444. *Cavendishia acuminata*.
- 622. *Psammisia sodiroi*.
- 731. *Macleania attenuata*.

JENMAN, G. S.

- 827. *Satyria panurensis*.
- 1031. *Thibaudia nutans*.

JIMÉNEZ, O.

- 1030. *Cavendishia smithii*.

JOHNSON, H.

- 134. *Cavendishia laurifolia*.
- 202. *Cavendishia callista*.
- 292. *Macleania insignis*.
- 510. *Satyria elongata*.
- 568. *Cavendishia guatemalensis*.
- 873. *Satyria meiantha*.

JULIO, BROTHER

- 447. *Thibaudia macrocalyx*.

KALBREYER, G.

- 286. *Psammisia penduliflora*.
- 905. *Cavendishia tarapotana*.
- 1027. *Cavendishia cordifolia*.
- 1059. *Orthaea cordata*.
- 1085. *Macleania longiflora*.
- 1306. *Cavendishia adenophora*.
- 1468. *Cavendishia guatapeensis*.
- 1597. *Themistoclesia dependens*.
- 1620. *Cavendishia kalbreyeri*.
- 1624. *Cavendishia angustifolia*.
- 1669. *Cavendishia amalfiensis*.
- 1670. *Psammisia breviflora*.

KARSTEN, G.

- 6. *Cavendishia splendens*.
- 169. *Semiramisia karsteniana*.

KILLIP, E. P.

- 5223. *Anthopterus wardii*.
- 5329. *Macleania pentaptera*.
- 7691. *Cavendishia marginata*.
- 7886. *Macleania amplexicaulis*.
- 7909. *Cavendishia complectens*.
- 11376. *Cavendishia adenophora*.
- 11851. *Anthopterus wardii*.

KILLIP, E. P., and HAZEN, T. E.

- 9104. *Cavendishia obtusa*.
- 9170. *Cavendishia montana*.
- 9462. *Thibaudia floribunda*.
- 9467. *Macleania nitida*.
- 9520. *Cavendishia montana*.
- 12138. *Satyria minutiflora*.
- 12144. *Cavendishia scabriuscula*.

KILLIP, E. P., and SMITH, A. C.

- 15049. *Psammisia penduliflora*.
- 15124. *Cavendishia killipii*.
- 15465. *Cavendishia pubescens*.
- 15722. *Macleania nitida*.
- 15794. *Themistoclesia vegasana*.
- 15803. *Cavendishia scabriuscula*.
- 15806. *Macleania nitida*.
- 15820. *Thibaudia floribunda*.
- 15871. *Cavendishia gracilis*.
- 15880. *Themistoclesia vegasana*.

15918. *Cavendishia pubescens*.
 15978. *Cavendishia splendens*.
 15980. *Cavendishia splendens*.
 15987. *Orthaea cavendishioides*.
 15997. *Cavendishia gracilis*.
 16090. *Cavendishia splendens*.
 16100. *Cavendishia scabriuscula*.
 16621. *Psammisia penduliflora*.
 16764. *Cavendishia splendens*.
 16777. *Psammisia penduliflora*.
 17174. *Psammisia falcata*.
 17280. *Macleania nitida*.
 17281. *Macleania nitida*.
 17336. *Macleania nitida*.
 17586. *Macleania nitida*.
 17698. *Macleania nitida*.
 17744. *Macleania nitida*.
 17857. *Cavendishia scabriuscula*.
 17873. *Psammisia penduliflora*.
 17994. *Macleania nitida*.
 18013. *Psammisia penduliflora*.
 18087. *Thibaudia floribunda*.
 18222. *Macleania nitida*.
 18370. *Psammisia falcata*.
 18606. *Macleania nitida*.
 18784. *Cavendishia scabriuscula*.
 18791. *Thibaudia floribunda*.
 18794. *Psammisia falcata*.
 18868. *Psammisia penduliflora*.
 18872. *Psammisia penduliflora*.
 18875. *Cavendishia cordifolia*.
 18883. *Cavendishia pubescens*.
 18888. *Cavendishia scabriuscula*.
 18950. *Cavendishia splendens*.
 19039. *Cavendishia pubescens*.
 19091. *Cavendishia pubescens*.
 19099. *Psammisia penduliflora*.
 19308. *Cavendishia pubescens*.
 19312. *Cavendishia scabriuscula*.
 19435. *Cavendishia pubescens*.
 19460. *Cavendishia pubescens*.
 19631. *Macleania nitida*.
 19738. *Macleania nitida*.
 19781. *Cavendishia scabriuscula*.
 19914. *Macleania nitida*.
 19936. *Themistoclesia hirsuta*.
 20051. *Psammisia penduliflora*.
 20055. *Cavendishia pubescens*.
 20108. *Psammisia penduliflora*.
 20481. *Psammisia penduliflora*.
 20587. *Psammisia penduliflora*.
 20588. *Cavendishia splendens*.
 20663. *Ceratostema coronarium*.

20674. *Cavendishia splendens*.
 20676. *Cavendishia splendens*.
 20731. *Cavendishia scabriuscula*.
 21172. *Macleania nitida*.
 21218. *Cavendishia cordifolia*.
 22199. *Cavendishia paniculata*.
 22297. *Cavendishia beckmanniana*.
 22387. *Cavendishia beckmanniana*.
 22432. *Cavendishia paniculata*.
 22489. *Cavendishia beckmanniana*.
 23141. *Cavendishia beckmanniana*.
 23209. *Cavendishia beckmanniana*.
 24138. *Psammisia coarctata*.
 24244. *Thibaudia ovata*.
 24256. *Cavendishia punctatifolia*.
 24269. *Cavendishia beckmanniana*.
 24353. *Thibaudia ovata*.
 24473. *Cavendishia punctatifolia*.
 24489. *Cavendishia pubescens*.
 24868. *Psammisia globosa*.
 24882. *Cavendishia pubescens*.
 25677. *Cavendishia acuminata*.
 25686. *Thibaudia biflora*.
 25850. *Semiramisia weberbaueri*.
 25938. *Cavendishia pubescens*.
 25946. *Cavendishia ulbrichiana*.

KLUG, G.

1678. *Psammisia guyanensis*.

KUNTZE, O.

1572. *Cavendishia pubescens*.
 1636. *Psammisia hookeriana*.
 2346, in part. *Cavendishia smithii*.
 2346, in part. *Macleania glabra*.

LANKESTER, C. H.

100. *Satyria warszewiczii*.
 107. *Cavendishia veraguensis*.
 109. *Psammisia ramiflora*.
 K79. *Macleania ovata*.
 K247. *Psammisia ramiflora*.

LECHLER, W.

1875. *Cavendishia beckmanniana*.
 1924a. *Cavendishia pubescens*.
 2053. *Siphonandra pilosa*.
 2198. *Cavendishia beckmanniana*.
 2276. *Siphonandra elliptica*.
 2386. *Psammisia pauciflora*.
 2585. *Ceratostema graebnerianum*.
 2693. *Ceratostema graebnerianum*.

LEHMANN, F. C.

160. *Cavendishia acuminata*.
 2954. *Cavendishia quereme*.
 4086. *Lysiclesia minor*.
 4452. *Psammisia columbiensis*.
 4763. *Cavendishia divaricata*.
 4961. *Psammisia lehmannii*.
 5437. *Macleania stricta*.
 5438. *Psammisia breviflora*.
 5439. *Psammisia sodiroi*.
 5620. *Themistoclesia dependens*.
 6299. *Cavendishia cordifolia*.
 7447. *Cavendishia gracilis*.
 7525. *Cavendishia lindauiana*.
 7527. *Cavendishia guatapeensis*.
 7535. *Thibaudia rigidiflora*.
 7895. *Cavendishia lehmannii*.
 8232. *Thibaudia lehmannii*.
 8417. *Psammisia macrophylla*.
 8418. *Cavendishia miconioides*.
 BT439. *Psammisia macrophylla*.
 BT639. *Psammisia macrophylla*.
 BT949. *Anthopterus bracteatus*.
 BT965. *Psammisia macrophylla*.
 K168. *Cavendishia adenophora*.
 K169. *Cavendishia adenophora*.
 K172. *Ceratostema rigidum*.
 K173. *Psammisia ferruginea*.
 K174. *Psammisia ecuadorensis*.
 K176. *Thibaudia paniculata*.
 K179. *Anthopterus wardii*.
 K180. *Psammisia macrophylla*.
 CCXXX. *Cavendishia lehmannii*.

LEIBOLD, F. E.

23. *Macleania insignis*.

LIEBMANN, F. M.

8643. *Macleania insignis*.
 8645. *Macleania insignis*.

LINDEN, J. J.

26. *Psammisia hookeriana*.
 50. *Cavendishia splendens*.
 283. *Psammisia penduliflora*.
 355. *Cavendishia splendens*.
 918. *Ceratostema pubiflorum*.
 949. *Cavendishia macrocephala*.
 951. *Psammisia grandiflora*.
 1304. *Cavendishia cordifolia*.

LLOYD, F. E.

302. *Gonocalyx smilacifolius*.

LOBB, W.

1. *Thibaudia ovata*.
 2. *Ceratostema buxifolium*.
 3. *Ceratostema grandiflorum*.
 79. *Periclesia flexuosa*.
 80. *Englerodoxa alata*.
 81. *Macleania stricta*.
 89. *Psammisia ferruginea*.
 161. *Englerodoxa alata*.
 224. *Cavendishia cordifolia*.
 252. *Ceratostema lobbii*.

MACBRIDE, J. F.

3361. *Ceratostema grandiflorum*.
 3544. *Ceratostema coccineum*.
 3558. *Cavendishia acuminata*.
 3632. *Cavendishia punctatifolia*.
 3664. *Macleania benthamiana*.
 4376. *Ceratostema coccineum*.
 4792. *Psammisia guyanensis*.
 4851. *Psammisia ulbrichiana*.
 4874. *Thibaudia floribunda*.
 4964. *Themistoclesia peruviana*.
 5626. *Psammisia coarctata*.
 5754. *Psammisia globosa*.

MACBRIDE, J. F., and FEATHERSTONE, W.

1402. *Thibaudia melliflora*.
 2163. *Ceratostema coccineum*.
 2227. *Cavendishia acuminata*.

MANDON, G.

548. *Ceratostema mandoni*.
 549. *Siphonandra pilosa*.
 550. *Cavendishia acuminata*.

MATHEWS, A.

- 883*. *Thibaudia ovalifolia*.
 884. *Siphonandra elliptica*.
 1442. *Macleania floribunda*.
 1443. *Thibaudia angustifolia*.
 1444. *Cavendishia acuminata*.
 2077. *Psammisia globosa*.
 2078, in part. *Cavendishia nobilis*.
 2078, in part. *Psammisia coarctata*.
 3041, in part. *Thibaudia moricandi*.
 3041, in part. *Thibaudia phyllireaefolia*.

MAXON, W. R.

5446. *Cavendishia wercklei*.

MAXON, W. R., and HARVEY, A. D.

7912. *Cavendishia endresii*.

7913. *Cavendishia smithii*.

7914. *Cavendishia smithii*.

8018. *Cavendishia endresii*.

8197. *Cavendishia melastomoides*.

8228. *Satyria warszewiczii*.

MAXON, W. R., HARVEY, A. D., and
VALENTINE, A. T.

7768. *Cavendishia smithii*.

MOBITZ, J.

479. *Psammisia hookeriana*.

772. *Psammisia hookeriana*.

1340. *Themistoclesia pendula*.

1346. *Cavendishia pubescens*.

1347. *Psammisia penduliflora*.

1347b. *Psammisia penduliflora*.

1348. *Cavendishia cordifolia*.

1349. *Macleania nitida*.

1662. *Themistoclesia pendula*.

1663. *Cavendishia splendens*.

NELSON, E. W.

778. *Cavendishia crassifolia*.

3328. *Satyria warszewiczii*.

3350. *Cavendishia laurifolia*.

3362. *Cavendishia laurifolia*.

NIEMEYER, E.

141a. *Cavendishia cordifolia*.

143. *Cavendishia cordifolia*.

OERSTED, A.

8569. *Cavendishia veraguensis*.

8572. *Cavendishia smithii*.

8574. *Macleania glabra*.

8648. *Macleania glabra*.

PACHANO, A.

179. *Macleania euryphylla*.

223. *Cavendishia hartwegiana*.

PEARCE, R.

126. *Thibaudia melliflora*.

236. *Psammisia ulbrichiana*.

731. *Orthaea boliviensis*.

790. *Siphonandra elliptica*.

814. *Orthaea constans*.

PENNEL, F. W.

1711. *Satyria panurensis*.

1769. *Cavendishia cordifolia*.

1770. *Cavendishia cordifolia*.

1782. *Cavendishia cordifolia*.

1924. *Thibaudia floribunda*.

1968. *Cavendishia cordifolia*.

2420. *Psammisia graebneriana*.

2447. *Cavendishia cordifolia*.

2572. *Cavendishia obtusa*.

2643. *Macleania hirtiflora*.

2646. *Macleania hirtiflora*.

2659. *Themistoclesia compacta*.

2695. *Cavendishia pubescens*.

2705. *Psammisia lanceolata*.

3116. *Macleania nitida*.

3178. *Cavendishia durifolia*.

3179. *Thibaudia pennellii*.

3191. *Satyria breviflora*.

3192. *Cavendishia pubescens*.

3193. *Cavendishia guatapeensis*.

3405. *Macleania nervosa*.

4299. *Cavendishia subamplexicaulis*.

4300. *Cavendishia guatapeensis*.

4301. *Cavendishia glandulosa*.

4307. *Cavendishia guatapeensis*.

4332. *Cavendishia guatapeensis*.

4375. *Cavendishia axillaris*.

4377. *Cavendishia sessiliflora*.

4389. *Lysiclesia caudata*.

4406. *Psammisia breviflora*.

4421. *Satyria pilosa*.

4441. *Cavendishia caudata*.

4484. *Satyria latifolia*.

4488. *Cavendishia compacta*.

4780. *Cavendishia sessiliflora*.

6953. *Psammisia graebneriana*.

7023. *Ceratostema rigidum*.

7465. *Macleania crassa*.

7557. *Cavendishia divaricata*.

7566. *Macleania pubiflora*.

7628. *Psammisia pennellii*.

7629. *Psammisia breviflora*.

8267. *Psammisia macrophylla*.

9303. *Cavendishia obtusa*.

9304. *Psammisia pennellii*.

9305. *Cavendishia montana*.

10308. *Psammisia macrophylla*.

10314. *Cavendishia acuminata*.

10315. *Psammisia macrophylla*.

10401. *Cavendishia adenophora*.

10402. *Cavendishia bomareoides*.

10403. *Psammisia grandiflora*.

10458. *Psammisia grandiflora*.
 10459. *Psammisia grandiflora*.
 10460. *Thibaudia floribunda*.
 10509. *Cavendishia acuminata*.
 10538. *Cavendishia acuminata*.
 10539. *Cavendishia scabriuscula*.
 10722. *Cavendishia pubescens*.
 10744. *Cavendishia pubescens*.
 10933. *Cavendishia pubescens*.
 13857. *Siphonandra elliptica*.
 13962. *Cavendishia paniculata*.
 13972. *Orthaea breviflora*.
 14009. *Cavendishia weberbaueri*.
 14015. *Cavendishia weberbaueri*.
 14028. *Psammisia ulbrichiana*.
 14096. *Ceratostema graebnerianum*.

PENNELL, F. W., and HAZEN, T. E.

10076. *Ceratostema pubiflorum*.
 10115. *Cavendishia scabriuscula*.

PENNELL, F. W., and KILLIP, E. P.

5750. *Psammisia pennellii*.
 5751. *Psammisia macrophylla*.
 5796. *Cavendishia adenophora*.
 5801. *Cavendishia spicata*.
 5802. *Thibaudia rigidiflora*.
 6324. *Psammisia killipii*.
 6369. *Psammisia macrophylla*.
 6397. *Cavendishia miconioides*.
 6519. *Psammisia graebneriana*.
 6524. *Thibaudia floribunda*.
 7290. *Psammisia pennellii*.
 7304. *Thibaudia floribunda*.
 7384. *Cavendishia divaricata*.
 8130. *Psammisia macrophylla*.
 8275. *Psammisia macrophylla*.
 8305. *Psammisia macrophylla*.
 8862. *Cavendishia scabriuscula*.

PEREZ, A. E.

1060. *Macleania nitida*.

PITTIER, E.

81. *Cavendishia pubescens*.
 129. *Psammisia hookeriana*.

PITTIER, H.

588. *Macleania pentaptera*.
 770. *Macleania antioquiæ*.
 1071. *Cavendishia acuminata*.
 1073. *Thibaudia floribunda*.

1180. *Themistoclesia dependens*.
 1226. *Cavendishia miconioides*.
 3014. *Satyria warszewiczii*.
 3036. *Cavendishia endresii*.
 3206. *Cavendishia wercklei*.
 3234. *Lateropora ovata*.
 5647. *Cavendishia splachnoides*.
 5651. *Cavendishia bomareoides*.
 5659. *Cavendishia splachnoides*.
 5872. *Cavendishia pubescens*.
 9175. *Cavendishia pubescens*.
 9263. *Cavendishia splendens*.
 9916. *Psammisia hookeriana*.
 9994. *Themistoclesia pendula*.
 11377. *Psammisia urichiana*.
 12874, in part. *Psammisia penduliflora*.
 12874, in part. *Cavendishia cordifolia*.

PITTIER, H.

(In J. D. Smith or Inst. Fis.-Geogr.
 Costa Rica series)

340. *Cavendishia callista*.
 2033, in part. *Cavendishia veraguensis*.
 2033, in part. *Macleania glabra*.
 3102. *Macleania glabra*.
 7546. *Macleania glabra*.
 7547. *Cavendishia veraguensis*.
 10170. *Cavendishia complectens*.
 11206. *Satyria warszewiczii*.
 12147. *Satyria triloba*.
 13047. *Macleania glabra*.
 14030. *Cavendishia quercina*.
 14031. *Cavendishia pterocarpa*.
 16609. *Cavendishia veraguensis*.
 16610. *Cavendishia quereme*.

POEPPIG, E. F.

1350. *Thibaudia biflora*.

POPENOE, W.

927. *Macleania insignis*.
 1017. *Macleania glabra*.
 1170. *Cavendishia cordifolia*.
 1292. *Englerodoxa alata*.
 1315. *Cavendishia hartwegiana*.
 1328. *Cavendishia acuminata*.
 1329. *Macleania poortmanni*.
 1330. *Macleania benthamiana*.
 1340. *Macleania loeseneriana*.

PRINGLE, C. G.

7870. *Macleania compacta*.

PURDIE, W.

103. *Orthaea apophysata*.

PURPUS, C. A.

288. *Macleania insignis*.
6313. *Macleania insignis*.
7342. *Cavendishia chiapensis*.
10410. *Cavendishia crassifolia*.

REKO, B. P.

4027. *Satyria elongata*.
4096. *Cavendishia crassifolia*.

ROSE, J. N.

22378. *Cavendishia acuminata*.
23169. *Cavendishia acuminata*.
23777. *Cavendishia acuminata*.
23914. *Macleania nitida*.

ROWLEE, W. W., and ROWLEE, H. E.

255. *Cavendishia complectens*.

RUSBY, H. H.

2033. *Cavendishia pubescens*.
2034. *Thibaudia boliviensis*.
2035. *Thibaudia macrocalyx*.
2036. *Siphonandra elliptica*.
2037. *Psammisia pauciflora*.
2038. *Psammisia guyanensis*.
2219. *Satyria neglecta*.
2403. *Cavendishia paniculata*.
2632. *Ceratostema mandoni*.
2692. *Rusbya taxifolia*.

RUSBY, H. H., and PENNELL, F. W.

563. *Cavendishia pubescens*.
567. *Cavendishia cordifolia*.
567A, in part. *Cavendishia cordifolia*.
567A, in part. *Cavendishia miconioides*.
599. *Psammisia lanceolata*.
676. *Cavendishia obtusa*.
750. *Psammisia lehmannii*.
751. *Psammisia lehmannii*.
847. *Cavendishia miconioides*.
865. *Psammisia falcata*.
875. *Psammisia lanceolata*.
939. *Cavendishia pubescens*.
982. *Thibaudia rigidiflora*.

84377—32—16

983. *Thibaudia rigidiflora*.
989. *Cavendishia cordifolia*.
990. *Cavendishia miconioides*.
991. *Cavendishia cordifolia*.
1290A. *Thibaudia rigidiflora*.

SAWADA, M.

- P36. *Psammisia coarctata*.
P43. *Thibaudia floribunda*.

SCHAFFNER, J. G.

538. *Macleania insignis*.

SCHLIM, L.

1095. *Cavendishia splendens*.

SCHOMBURGK, RICHARD

35. *Orthaea hispida*.
566, in part. *Thibaudia nutans*.
566, in part. *Notopora schomburgkii*.
567/873. *Thibaudia nutans*.
867. *Notopora schomburgkii*.
873. *Thibaudia nutans*.
924. *Thibaudia nutans*.
974. *Psammisia guyanensis*.
1018. *Cavendishia duidae*.
1040. *Thibaudia formosa*.

SCHULTZE, A.

15. *Cavendishia cordifolia*.
54. *Macleania nitida*.
70. *Psammisia falcata*.

SEEMANN, B. C.

1079. *Macleania pentaptera*.
1172. *Satyria warszewiczii*.

SELER, E.

3107. *Cavendishia guatemalensis*.

SHAFFER, J. A.

3641. *Gonocalyx portoricensis*.

SINTENIS, P.

1363. *Gonocalyx portoricensis*.

SMITH, H. H.

1554. *Psammisia elegans*.
1722. *Macleania robusta*.
1964. *Macleania hirtiflora*.
2789. *Macleania robusta*.

SMITH, J. D.

4876. *Cavendishia smithii*.
 6636. *Cavendishia smithii*.
 6637. *Satyria warszewiczii*.

SODIRO, L.

- 92/1. *Macleania rotundifolia*.
 92/2. *Macleania pentaptera*.
 92/2b. *Macleania longiflora*.
 92/2C. *Macleania ecuadorensis*.
 92/2c. *Macleania loeseneriana*.
 92/2D. *Macleania ecuadorensis*.
 92/3. *Macleania loeseneriana*.
 92/3b. *Psammisia graebneriana*.
 92/4. *Psammisia ulbrichiana*.
 92/4b. *Psammisia sodiroi*.
 92/4c. *Englerodoxa alata*.
 92/5. *Psammisia ulbrichiana*.
 92/6. *Psammisia ecuadorensis*.
 92/7. *Psammisia ecuadorensis*.
 92/9. *Psammisia ecuadorensis*.
 92/11. *Macleania nitida*.
 92/11b, in part. *Thibaudia floribunda*.
 92/11b, in part. *Macleania pilgeriana*.
 92/12. *Psammisia sodiroi*.
 92/14. *Psammisia graebneriana*.
 92/15. *Thibaudia floribunda*.
 92/16. *Cavendishia acuminata*.
 92/17. *Cavendishia acuminata*.
 92/18. *Cavendishia acuminata*.
 92/18c, in part. *Cavendishia acuminata*.
 92/18c, in part. *Cavendishia gilgiana*.
 92/18c, in part. *Cavendishia grandifolia*.
 92/19, in part. *Cavendishia engleriana*.
 92/19, in part. *Cavendishia gilgiana*.
 92/20. *Cavendishia venosa*.
 92/35. *Themistoclesia dependens*.
 92/36. *Cavendishia complectens*.

SPRUCE, R.

2465. *Psammisia guyanensis*.
 2704. *Satyria panurensis*.
 2705. *Psammisia guyanensis*.
 4302. *Cavendishia tarapotana*.
 4357. *Psammisia guyanensis*.
 4430. *Thibaudia biflora*.
 4999. *Macleania nitida*.
 5036. *Psammisia guyanensis*.
 5074. *Cavendishia tarapotana*.
 5094. *Englerodoxa calycina*.
 5095. *Cavendishia hartwegiana*.

5550. *Macleania hirtiflora*.
 5842. *Macleania reducta*.
 6088. *Thibaudia biflora*.
 6168. *Macleania cordifolia*.
 6169. *Psammisia ecuadorensis*.

STANDLEY, P. C.

32918. *Cavendishia complectens*.
 32950. *Cavendishia complectens*.
 32954. *Cavendishia smithii*.
 32987. *Cavendishia smithii*.
 32999. *Cavendishia smithii*.
 33002. *Thibaudia costaricensis*.
 33071. *Cavendishia smithii*.
 33088. *Cavendishia smithii*.
 33089. *Cavendishia longiflora*.
 33205. *Cavendishia complectens*.
 33496. *Satyria warszewiczii*.
 33507. *Cavendishia capitulata*.
 33618. *Cavendishia quereme*.
 33906. *Cavendishia complectens*.
 34145. *Cavendishia quercina*.
 34194. *Satyria warszewiczii*.
 34325. *Macleania glabra*.
 34329. *Cavendishia costaricensis*.
 34334. *Cavendishia costaricensis*.
 34467. *Cavendishia costaricensis*.
 34878. *Cavendishia smithii*.
 34975a. *Macleania glabra*.
 35257. *Macleania glabra*.
 35698. *Cavendishia smithii*.
 36130. *Cavendishia quereme*.
 36201. *Satyria warszewiczii*.
 36223. *Cavendishia quereme*.
 36258. *Cavendishia smithii*.
 36360. *Cavendishia capitulata*.
 36395. *Cavendishia capitulata*.
 36552. *Cavendishia quereme*.
 37593. *Cavendishia quereme*.
 37622. *Cavendishia endresii*.
 37633. *Cavendishia quereme*.
 37657. *Satyria warszewiczii*.
 37664. *Cavendishia capitulata*.
 37807. *Cavendishia quereme*.
 37862. *Cavendishia capitulata*.
 38053. *Thibaudia costaricensis*.
 38072. *Thibaudia costaricensis*.
 38108. *Satyria warszewiczii*.
 38121. *Cavendishia complectens*.
 38134. *Cavendishia complectens*.
 38211. *Psammisia ramiflora*.
 38508. *Cavendishia melastomoides*.
 38601. *Satyria warszewiczii*.

38631. *Cavendishia smithii*.
 38741. *Cavendishia melastomoides*.
 38853. *Cavendishia smithii*.
 39162. *Cavendishia complectens*.
 39275. *Psammisia ramiflora*.
 39375. *Cavendishia capitulata*.
 39418. *Cavendishia capitulata*.
 39469. *Cavendishia costaricensis*.
 39538. *Cavendishia capitulata*.
 39581. *Cavendishia capitulata*.
 39634. *Cavendishia capitulata*.
 39814. *Cavendishia complectens*.
 39832. *Cavendishia quereme*.
 39852. *Cavendishia capitulata*.
 41647. *Satyria warszewiczii*.
 42070. *Satyria warszewiczii*.
 42190. *Cavendishia costaricensis*.
 42205. *Cavendishia quercina*.
 42286. *Satyria warszewiczii*.
 42287. *Cavendishia smithii*.
 42325. *Macleania glabra*.
 42578. *Cavendishia quercina*.
 42650. *Cavendishia costaricensis*.
 42657. *Macleania glabra*.
 42677. *Cavendishia quercina*.
 42683. *Macleania glabra*.
 42722. *Macleania glabra*.
 42772. *Cavendishia quercina*.
 42792. *Cavendishia quercina*.
 42978. *Satyria warszewiczii*.
 43048. *Macleania glabra*.

STANDLEY, P. C., and TORRES, R.

47431. *Satyria warszewiczii*.
 47623. *Cavendishia capitulata*.
 50883. *Macleania ovata*.
 51279. *Cavendishia bullata*.
 51292. *Thibaudia costaricensis*.
 51376. *Thibaudia costaricensis*.
 51400. *Cavendishia quereme*.
 51738. *Cavendishia complectens*.
 51772. *Cavendishia complectens*.

STANDLEY, P. C., and VALERIO, J.

43440. *Satyria warszewiczii*.
 43720. *Macleania glabra*.
 43907. *Macleania glabra*.
 44005. *Macleania glabra*.
 44022. *Macleania glabra*.
 44734. *Cavendishia capitulata*.
 44822. *Cavendishia capitulata*.
 45381. *Cavendishia capitulata*.
 45434. *Cavendishia capitulata*.

45623. *Cavendishia capitulata*.
 46262. *Satyria warszewiczii*.
 46948. *Satyria elongata*.
 47120. *Satyria warszewiczii*.
 48023. *Cavendishia quercina*.
 48122. *Cavendishia quercina*.
 48148. *Satyria warszewiczii*.
 49037. *Satyria warszewiczii*.
 49091. *Cavendishia smithii*.
 49837. *Cavendishia pterocarpa*.
 50189. *Cavendishia costaricensis*.
 50266. *Satyria warszewiczii*.
 50415. *Cavendishia costaricensis*.
 50648. *Satyria warszewiczii*.
 50752. *Cavendishia costaricensis*.
 50822. *Cavendishia pterocarpa*.
 51589. *Cavendishia costaricensis*.
 51919. *Cavendishia quereme*.
 51928. *Cavendishia complectens*.
 52038. *Cavendishia costaricensis*.
 52276. *Cavendishia costaricensis*.
 52311. *Cavendishia costaricensis*.
 52342. *Cavendishia costaricensis*.

STEINBACH, J.

8860. *Cavendishia beckmanniana*.
 9023. *Cavendishia pubescens*.
 9529. *Siphonandra elliptica*.

STEVENS, F. L.

75. *Cavendishia costaricensis*.

STOBK, H. E.

363. *Cavendishia capitulata*.
 390. *Cavendishia costaricensis*.
 429. *Cavendishia endresii*.
 1050. *Satyria warszewiczii*.
 1111. *Satyria warszewiczii*.
 1115. *Cavendishia costaricensis*.
 1161. *Cavendishia smithii*.
 1264. *Cavendishia smithii*.
 1313. *Psammisia ramiflora*.
 1316. *Cavendishia costaricensis*.
 1789. *Cavendishia bullata*.
 2064. *Satyria warszewiczii*.
 2070. *Macleania glabra*.
 2567. *Cavendishia costaricensis*.
 2569. *Cavendishia melastomoides*.

STUEBEL, A.

- 120b. *Cavendishia cordifolia*.
 149a. *Cavendishia obtusa*.

- 150b. *Macleania nitida*.
 164a. *Thibaudia floribunda*.
 271a. *Ceratostema rigidum*.
 317a. *Cavendishia quereme*.
 340a. *Cavendishia quereme*.

TATE, G. H. H.

200. *Thibaudia macrocalyx*.
 214. *Themistoclesia pendula*.
 215. *Themistoclesia pendula*.
 284. *Thibaudia nutans*.
 312. *Ceratostema mandoni*.
 370. *Ceratostema mandoni*.
 371. *Siphonandra elliptica*.
 372. *Thibaudia axillaris*.
 402. *Thibaudia nutans*.
 409. *Thibaudia glandulifera*.
 457. *Thibaudia glandulifera*.
 525. *Thibaudia glandulifera*.
 602. *Thibaudia truncata*.
 603. *Mycerinus sclerophyllus*.
 629. *Cavendishia hartwegiana*.
 670. *Cavendishia tarapotana*.
 694. *Thibaudia glandulifera*.
 703. *Cavendishia duida*.
 729. *Thibaudia formosa*.
 862. *Siphonandra elliptica*.
 903. *Thibaudia formosa*.
 1048 (Venezuela). *Cavendishia duida*.
 1048 (Bolivia). *Cavendishia paniculata*.

TESSMANN, G.

3954. *Psammisia guyanensis*.
 4662. *Satyria panurensis*.

THURN, E. IM

- 49, in part. *Psammisia guyanensis*.
 49, in part. *Thibaudia roraimae*.
 56. *Thibaudia nutans*.
 109. *Notopora schomburgkii*.

TONDUZ, A.

(Distributed in Inst. Fis.-Geogr. Costa Rica series)

1881. *Satyria warszewiczii*.
 7391. *Cavendishia longiflora*.
 7404. *Cavendishia complectens*.
 7462. *Cavendishia smithii*.
 10781. *Cavendishia smithii*.

12232. *Satyria warszewiczii*.
 12251. *Macleania glabra*.
 12351. *Cavendishia smithii*.
 12438. *Satyria warszewiczii*.
 12657. *Cavendishia smithii*.
 13371. *Satyria elongata*.
 17836. *Satyria warszewiczii*.

TORO, R. A.

191. *Cavendishia pubescens*.
 468. *Cavendishia guatapeensis*.
 1131. *Satyria toroi*.
 1172. *Cavendishia bomareoides*.

TRACEY, MRS. I. A.

14. *Cavendishia cordifolia*.
 20. *Psammisia graebneriana*.
 269. *Cavendishia obtusa*.
 270. *Psammisia lehmannii*.
 335. *Cavendishia rigidifolia*.
 336. *Cavendishia pubescens*.

TRIANA, J.

36. *Macleania nitida*.
 37. *Psammisia grandiflora*.
 253. *Satyria breviflora*.
 345. *Psammisia penduliflora*.
 2668. *Cavendishia pubescens*.
 2669. *Psammisia macrophylla*.
 2670. *Psammisia graebneriana*.
 2671. *Cavendishia quereme*.
 2672. *Macleania pubiflora*.
 2674. *Psammisia macrophylla*.
 2675. *Cavendishia oligantha*.
 2677. *Cavendishia cordifolia*.
 2681. *Psammisia ferruginea*.
 2685. *Psammisia falcata*.
 2686. *Psammisia falcata*.
 2689. *Thibaudia pachyantha*.
 2694. *Satyria grandifolia*.
 2699. *Cavendishia compacta*.
 2703. *Macleania nitida*.
 2708. *Macleania macrantha*.
 2709. *Cavendishia hispida*.
 2712. *Macleania pentaptera*.
 2716. *Anthopterus wardii*.
 2718. *Anthopterus cuneatus*.
 4333. *Macleania nitida*.
 4333/19. *Psammisia lanceolata*.

TUERCKHEIM, H. VON

64. *Cavendishia laurifolia*.
 941. *Cavendishia callista*.

1190. *Macleania insignis*.
 1332. *Macleania linearifolia*.
 4119. *Cavendishia callista*.
 7633. *Satyria elongata*.
 7916. *Cavendishia callista*.
 II. 1626. *Cavendishia laurifolia*.
 II. 1661. *Macleania insignis*.
 II. 1795. *Cavendishia callista*.
 II. 2101. *Satyria meiantha*.
 II. 2153. *Macleania insignis*.

ULE, E.

- 52p. *Semiramisia weberbaueri*.
 6340. *Psammisia guyanensis*.
 6672. *Satyria panurensis*.
 6789. *Cavendishia ulei*.
 6790. *Thibaudia biflora*.
 8669. *Notopora schomburgkii*.
 8714. *Psammisia urichiana*.
 8715. *Thibaudia roraimae*.
 8719. *Thibaudia nutans*.
 br. 40. *Thibaudia nutans*.

WEBERBAUER, A.

594. *Cavendishia pubescens*.
 636. *Cavendishia beckmanniana*.
 684. *Orthaea weberbaueri*.
 740. *Siphonandra elliptica*.
 742. *Ceratostema graebnerianum*.
 742a. *Ceratostema mandoni*.
 889. *Ceratostema mandoni*.
 1081. *Cavendishia peruviana*.
 1081a. *Cavendishia pubescens* var. *microphylla*.
 1159. *Psammisia coarctata*.
 1770. *Cavendishia bracteata*.
 1972. *Cavendishia punctatifolia*.
 2055. *Thibaudia engleriana*.
 2071. *Thibaudia apophysata*.
 2075. *Ceratostema buxifolium*.
 2151. *Psammisia coarctata*.
 2202. *Ceratostema grandiflorum*.
 2436. *Thibaudia ovata*.
 2505. *Ceratostema coccineum*.
 3374. *Ceratostema harmsianum*.
 3510. *Psammisia coarctata*.
 3518. *Cavendishia urbaniana*.
 3542. *Thibaudia harmsiana*.
 4182. *Macleania nitida*.
 4339. *Thibaudia angustifolia*.
 4374. *Thibaudia tomentosa*.
 4449. *Thibaudia urbaniana*.

4455. *Semiramisia weberbaueri*.
 4739. *Cavendishia weberbaueri*.
 4753. *Orthaea engleriana*.
 4974. *Ceratostema microphyllum*.
 5009. *Cavendishia paniculata*.
 5861. *Siphonandra elliptica*.
 6041. *Macleania nitida*.
 6120. *Macleania farinosa*.
 6122. *Cavendishia ulei*.
 6644. *Ceratostema spectabile*.
 6704. *Macleania benthamiana*.
 6925. *Orthaea pinnatinervia*.
 6928. *Ceratostema microphyllum*.
 6929. *Siphonandra elliptica*.
 7154. *Thibaudia obovata*.
 7532. *Thibaudia laxa*.
 7790. *Ceratostema microphyllum*.
 7814. *Orthaea pinnatinervia*.
 7816. *Cavendishia weberbaueri*.

WERCKLÉ, C.

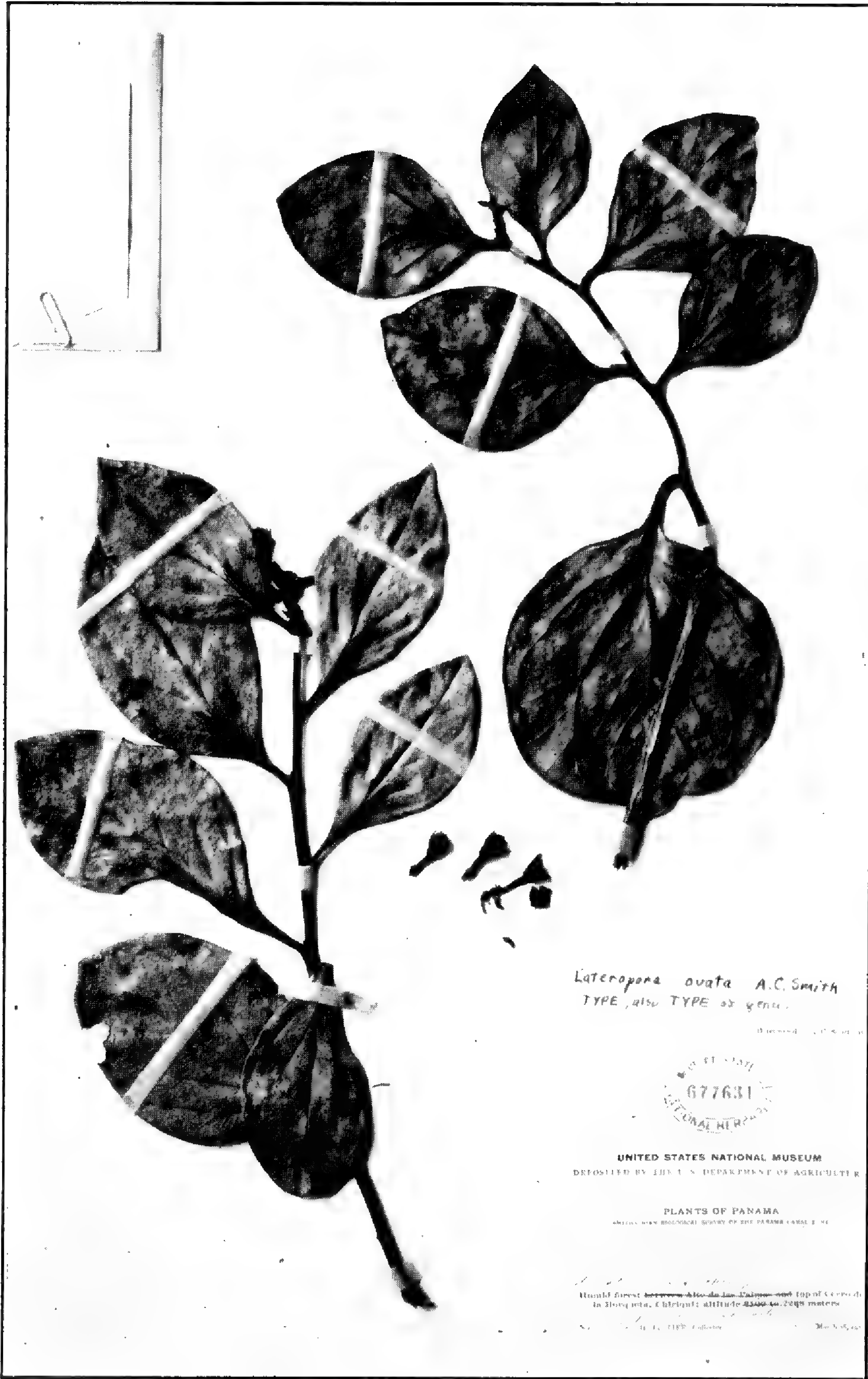
19. *Cavendishia endresii*.
 20. *Thibaudia costaricensis*.
 26. *Psammisia ramiflora*.
 29. *Cavendishia melastomoides*.
 50. *Cavendishia endresii*.
 52. *Thibaudia costaricensis*.
 53. *Cavendishia wercklei*.
 54. *Cavendishia costaricensis*.
 11301. *Satyria warszewiczii*.
 11565. *Cavendishia capitulata*.
 11567. *Cavendishia quereame*.
 11597. *Cavendishia smithii*.
 11598. *Cavendishia complectens*.
 11605. *Satyria warszewiczii*.
 11606. *Psammisia ramiflora*.
 16588. *Macleania glabra*.
 16650. *Macleania ovata*.
 16684. *Cavendishia smithii*.
 17413. *Cavendishia smithii*.

WILLIAMS, L.

934. *Satyria panurensis*.
 1108. *Satyria panurensis*.
 7343. *Psammisia guyanensis*.
 7597. *Psammisia ulbrichiana*.
 7712. *Psammisia guyanensis*.

WILLIAMS, R. S.

1581. *Thibaudia boliviensis*.
 2487. *Psammisia elliptica*.



Lateropora ovata A.C. Smith
TYPE, also TYPE of genus.

Described by A.C. Smith



UNITED STATES NATIONAL MUSEUM
DEPOSITED BY THE U.S. DEPARTMENT OF AGRICULTURE

PLANTS OF PANAMA
HERBARIUM OF THE PANAMA CANAL ZONE

Humid forest between Alto de las Talpas and top of Cerro de la Boquerita, Chiriquí; altitude 4500-4600 meters
A.C. Smith, collector. Mar. 25, 1950

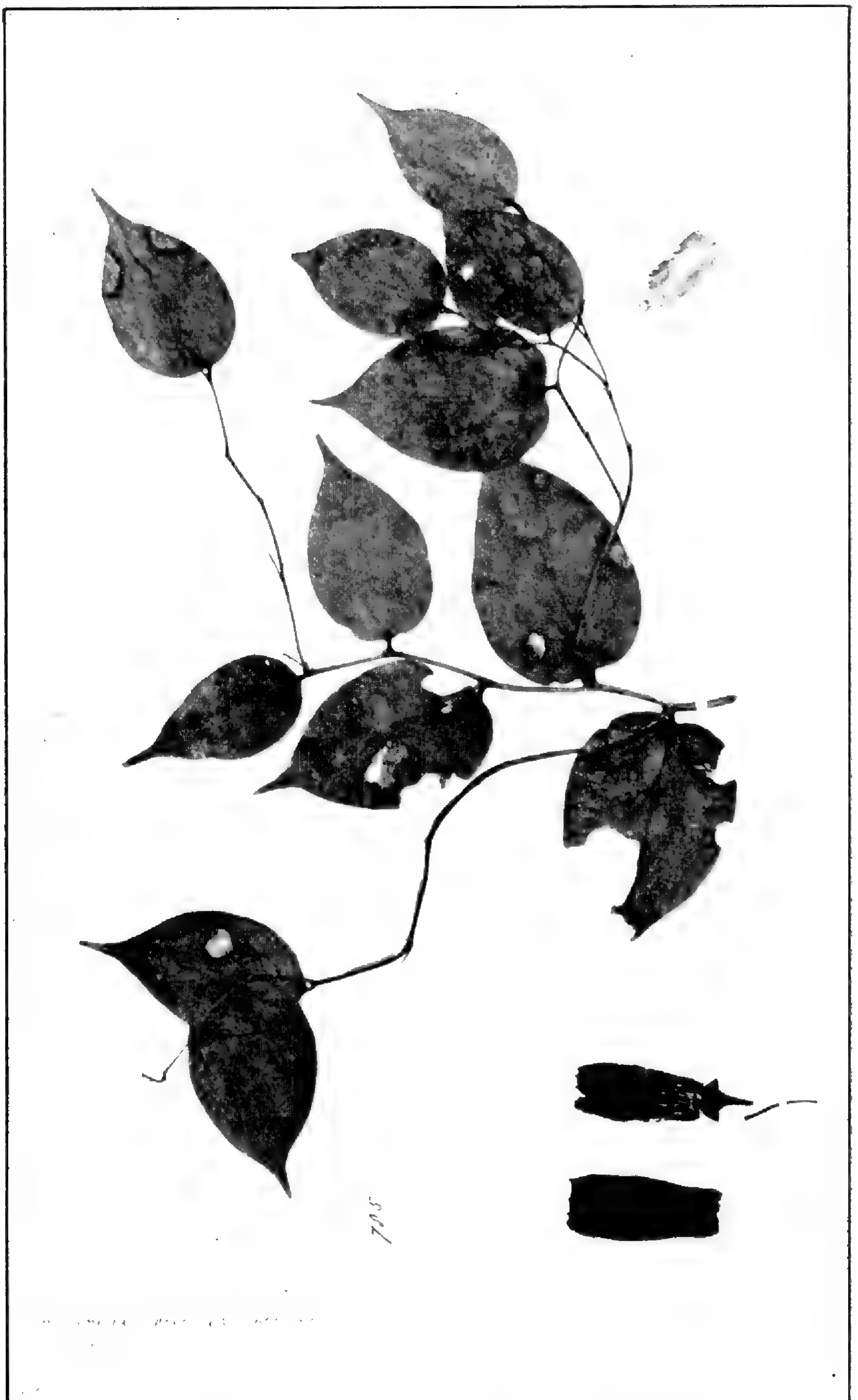
LATEROPORA OVATA A. C. SMITH



CERATOSTEMA LOBBII A. C. SMITH



CERATOSTEMA SPECTABILE RUSBY



SEMIRAMISIA SPECIOSA (BENTH.) KLOTZSCH



ENGLERODOXA CALYCINA (BENTH. & HOOK.) A. C. SMITH



GONOCALYX PORTORICENSIS (URBAN) A. C. SMITH



Periclesia flexuosa A.C. Smith
TYPE, also type of genus

PERICLESIA FLEXUOSA A. C. SMITH



MACLEANIA AMPLEXICAULIS A. C. SMITH



PSAMMISIA GLOBOSA A. C. SMITH



PSAMMISIA FERRUGINEA A. C. SMITH

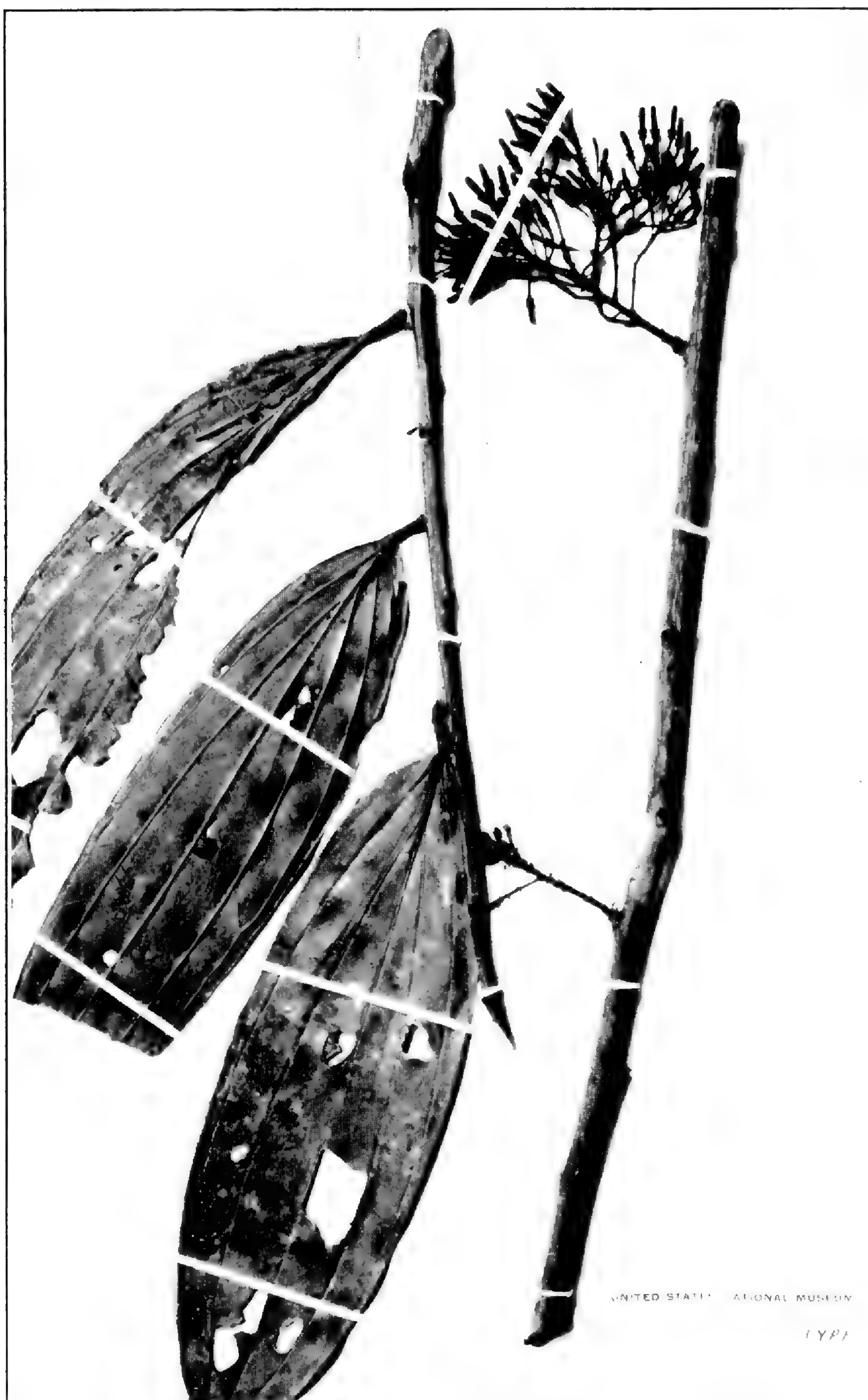


HERBARIUM LEHMANNIANUM COLOMBIANUM.

No. 10,000

1900

ANTHOPTERUS BRACTEATUS A. C. SMITH



UNITED STATES NATIONAL MUSEUM

TYPE

THIBAUDIA ARCHERI A. C. SMITH



THIBAUDIA REGULARIS A. C. SMITH



UNITED STATES NATIONAL MUSEUM

EXPLORATION IN COLOMBIA
EASTERN COLOMBIA

Tree 10-15 ft; branches dependent.
Corolla red. Fruits.
Dept. Santander, Mountains east of Las Vegas; alt. 1,000-1,300
meters.

Themistoclesia vegasana A. C. Smith
TYPE

No. 15794 E. P. Killip } Collectors. Dec 20-21, 1941
ALBERT C. SMITH }

Collected under the auspices of the New York Botanical Garden
Gray Herbarium of Harvard University, United States
National Museum and the Arnold Arboretum

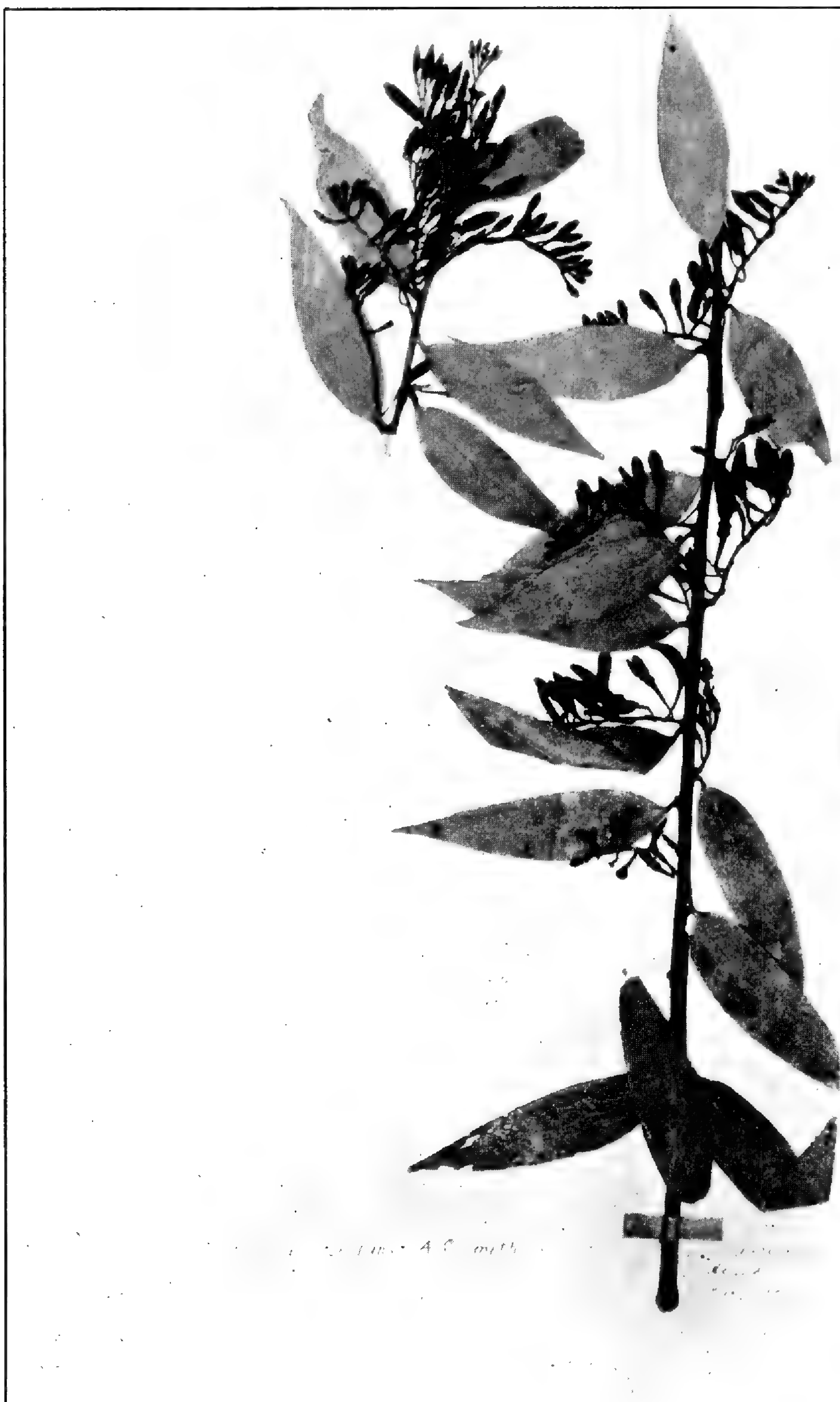
THEMISTOCLESIA VEGASANA A. C. SMITH



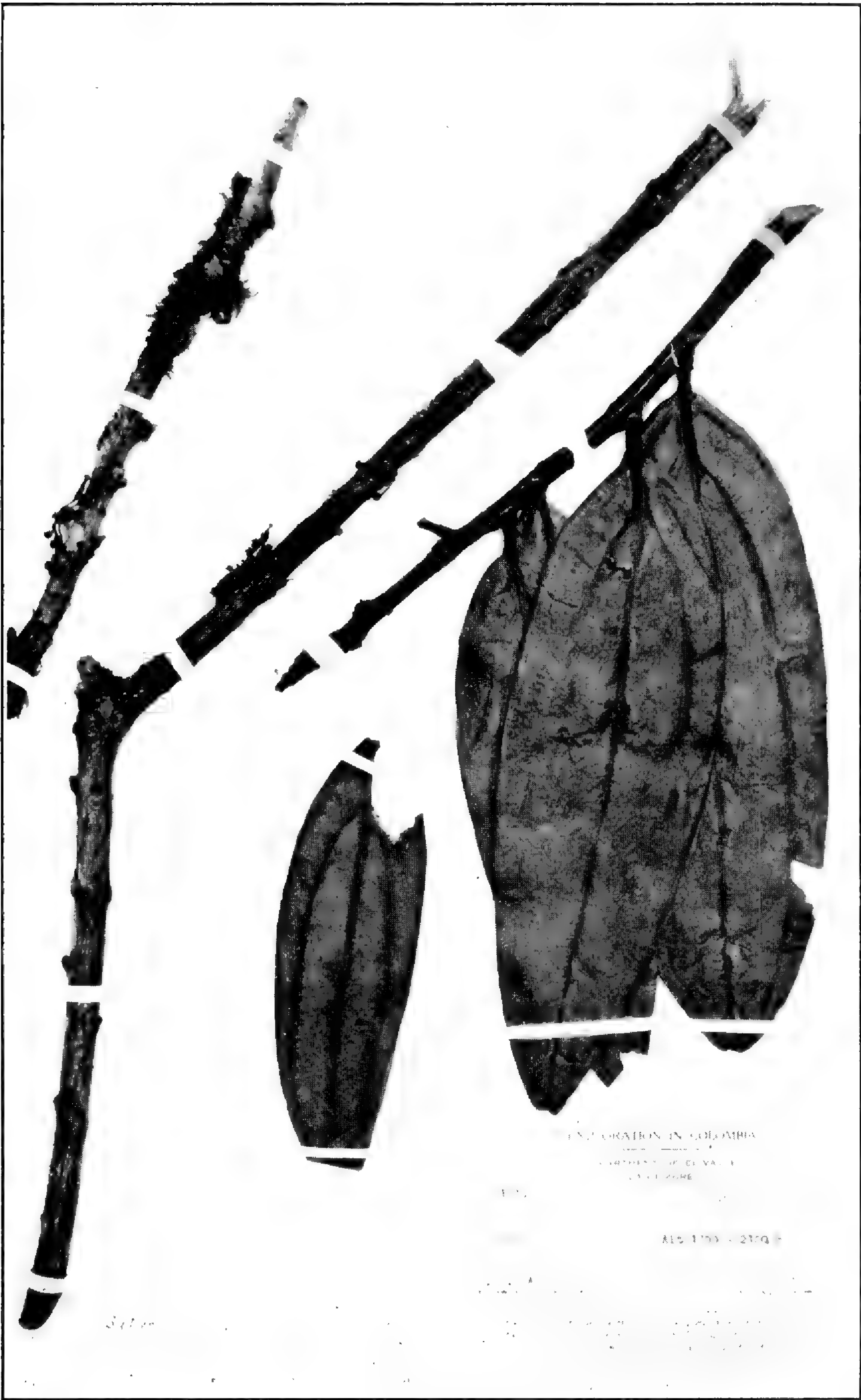
CAVENDISHIA SPICATA A. C. SMITH



CAVENDISHIA OBTUSA A. C. SMITH



ORTHAEA CONSTANS A. C. SMITH



SATYRIA MINUTIFLORA A. C. SMITH

INDEX

[Page numbers of principal entries in heavy-faced type. Synonyms in *italic*]

	Page	Cavendishia--Continued.	Page
Anthopterus	313, 324, 332, 406	<i>guatapeensis</i>	494
<i>bracteatus</i>	409	<i>guatemalensis</i>	459
<i>calycinus</i>	351	<i>hartwegiana</i>	489, 490
<i>cuneatus</i>	407	<i>hendersoni</i>	504
<i>mucronatus</i>	409	<i>hispida</i>	469
<i>pearcei</i>	446	<i>hoffmannii</i>	462
<i>racemosus</i>	407	<i>kalbreyeri</i>	478
<i>taxifolius</i>	445	<i>killipii</i>	483
<i>wardii</i>	408, 409	<i>klotzschiana</i>	454
Adanson	312	<i>kraenzliniana</i>	480
Agapetes	316	<i>latifolia</i>	459
Agathothibaudia	323, 324, 333, 410, 415	<i>laurifolia</i>	439, 456
Arrayán	526	<i>lehmannii</i>	500
Asiatic species	316	<i>lindauliana</i>	469, 470
Bentham and Hooker	314, 320	<i>longiflora</i>	452, 470
Biramia	360	<i>macrocephala</i>	475
<i>tuberosa</i>	369	<i>marginata</i>	499
Boton-boton	492	<i>melastomoides</i> Hemsl.....	454, 503
Cacaguito	377	<i>melastomoides</i> Hoer.....	503
Calyx, anatomy of	318	<i>miconioides</i>	454, 503
Cavendishia	312, 313, 315, 318, 321, 323, 324, 327, 330, 331, 333, 347, 430, 438, 439, 446, 512.	<i>montana</i>	492
<i>acuminata</i>	503, 506, 509	<i>muschleriana</i>	482
<i>adenophora</i>	473	<i>nobilis</i>	446, 508
<i>alata</i>	509	<i>obtusa</i>	498
<i>amalfiensis</i>	472	<i>oligantha</i>	496
<i>augustifolia</i>	498	<i>paniculata</i>	482
<i>axillaris</i>	493	<i>peruviana</i>	484
<i>beckmanniana</i>	491	<i>pilgeriana</i>	504, 505
<i>benthamiana</i>	503	<i>pseudopubescens</i>	502
<i>bomareoides</i>	470	<i>pterocarpa</i>	449
<i>bracteata</i>	489, 490, 505	<i>pubescens</i>	460, 484, 485, 487
<i>bullata</i>	453	<i>boliviensis</i>	487
<i>callista</i>	451	<i>microphylla</i>	487
<i>capitata</i>	507, 508	<i>punctatifolia</i>	480
<i>capitulata</i>	450	<i>purdiei</i>	472, 475
<i>caudata</i>	496	<i>quercina</i>	450
<i>chiapensis</i>	458, 463	<i>quereme</i>	446, 457, 495
<i>compacta</i>	468	<i>rigidifolia</i>	500
<i>complectens</i>	448, 468	<i>scabriuscula</i>	490
<i>cordata</i>	487	<i>secundiflora</i>	504, 505
<i>cordifolia</i>	487, 490, 493, 505	<i>sessiliflora</i>	483
<i>costaricensis</i>	461	<i>sillarensis</i>	487
<i>crassifolia</i>	439, 457	<i>smithii</i>	460
<i>divaricata</i>	481	<i>spicata</i>	479
<i>duidae</i>	473	<i>splachnoides</i>	471
<i>durifolia</i>	493	<i>splendens</i>	505
<i>endresii</i>	455	<i>strobilifera</i>	509
<i>engleriana</i>	477	<i>subamplexicaulis</i>	478
<i>gilgiana</i>	477	<i>tarapotana</i>	476
<i>glandulosa</i>	497	<i>tuerckheimii</i>	456
<i>glutinosa</i>	455	<i>ulbrichiana</i>	490
<i>gracilis</i>	501	<i>ulei</i>	506
<i>graebneriana</i>	454	<i>urbaniana</i>	508
<i>grandifolia</i>	476	<i>urichiana</i>	393
		<i>venosa</i>	474

X CONTRIBUTIONS FROM THE NATIONAL HERBARIUM

Cavendishia—Continued.		Page	Chupalon—Continued.		Page
veraguensis		461	nobile		508
warszewiczii		463	penduliflorum		403
weberbaueri		505, 506	pseudopubescens		502
wercklei		455	pubescens		485
Ceratostema		312,	quereme		495
	313, 314, 315, 317, 324, 327, 328, 329, 332,		scabriusculum		490
	333, 335, 352, 355, 445.		splendens		505
andreaum		347	strobiliferum		509
biflorum		435	tarapotatum		476
buxifolium		328, 340	turbinatum		415
calycinum		351	veraguense		461
chillacochense		347	viridiflorum		482
coccineum		328, 338	warszewiczii		463
cordifolium		339	Colmillo	316, 378, 393, 526	
coronarium		328, 344	Coral	404, 489, 506	
ellipticum		356	Coralito		420
emarginatum		347	Disterigma		320
graebnerianum	328, 341, 342, 343		Drude		320
grandiflorum		328, 338	Dunal		313
harmsianum	328, 340, 347		Englerodoxa	315, 329, 332, 350	
hirsutum		328, 339	alata		320, 350
hookeri		356	calycina		351
karstenianum		348	loranthiflora		352
lanceolatum		328, 344	Episcopia pendula		441
lobbii		328, 337	Eurygania	314, 323, 410	
longiflorum		338	angustifolia		431
loranthiflorum		352	biflora		435
mandoni		328, 342	elliptica		356
microphyllum		328, 341	multiflora		437
nutans		423	ovata		433
oblongifolium		347	parrifolia		428
odoratissimum		495	phyllireaefolia		430
parvifolium	328, 346, 428		subcrenulata		439
peruvianum	312, 328, 347		Findlaya	314, 509, 516	
pilgerianum		342, 343	apophysata		516
portoricense		354	Flora Peruviana et Chilensis		312
pubiflorum		328, 346	Food, use of the tribe as		315
rigidum		328, 345	Gonocalyx	314, 329, 352	
salapa		372	portoricensis		354
sanguineum		342	pulcher	329, 353	
serratum		416	smilacifolius		354
smilacifolium		354	Grisebach		314
speciosum		328, 345	Hoerold		315
spectabile		328, 343	Hornemannia		320
ulei		423	boliviensis		437
urbanianum		338	smilacifolia		354
weberbaueri		356, 357	Horticultural value		313, 315
Chaqui-lulu		382	Hualcon	316, 382, 505	
Chupalon		312, 446	Humboldt, Bonpland, & Kunth		313
acuminatum		503	Joyapa		375, 505
alatum		509	Klotzsch		314
benthamianum		503	Lysiclesia	327, 329, 330, 331, 333, 517	
bracteatum		490	caudata		518
capitatum		507	minor		519
complectens		448	Lateropora	319, 321, 330, 331, 333	
cordatum		487	ovata		334
cordifolium		487	Lechler		314
crassifolium		457	Macleania	313,	
endresii		455		321, 323, 325, 326, 327, 332, 359, 360, 384, 404	
formosum		420	alpicola		376, 377
guianense		399	amplexicaulis		367
hartwegianum		489	angulata		365
latifolium		459	antioquiae		364
laurifolium		456	arcuata		378
leucostomum		399	attenuata		379
melastomoides		454	benthamiana		374

Macleania—Continued.		Page	Orthaea—Continued.		Page
<i>colorata</i>		369	<i>boliviensis</i>		513
<i>compacta</i>		369	<i>breviflora</i>		513
<i>cordata</i>	369, 370		<i>cavendishoides</i>	511, 514	
<i>linearifolia</i>		368	<i>constans</i>		512
<i>cordifolia</i>	325, 366, 370, 384		<i>cordata</i>	510, 512	
<i>costaricensis</i>		377	<i>engleriana</i>	514, 517	
<i>crassa</i>		373	<i>hispida</i>		517
<i>crenulata</i>		384	<i>lehmannii</i>		495
<i>ecuadorensis</i>		380	<i>pinnatinervia</i>		515
<i>elliptica</i> Hoer.....		381	<i>secundiflora</i>	509, 512, 513	
<i>elliptica</i> Rusby.....		395	<i>weberbaueri</i>		515
<i>euryphylla</i>		373	<i>Oxycoccus</i>		312
<i>farinosa</i>		383	<i>Quereme</i>		495
<i>floribunda</i> Benth.....		374	<i>Pavon, Ruiz and</i>		312
<i>floribunda</i> Hook.....	325, 326, 363, 365		<i>Pentapterygium</i>		316
<i>glabra</i>	325, 377		<i>Periclesia</i>	329, 332, 357	
<i>hirtiflora</i>		382	<i>flexuosa</i>		357
<i>humboldtiana</i>	441, 442		<i>Polyboea</i>	314, 446, 457	
<i>insignis</i>		369	<i>crassifolia</i>		457
<i>irazuensis</i>	377, 378		<i>laurifolia</i>		456
<i>kalbreyeri</i>		403	<i>quereme</i>		495
<i>laurina</i>		382	<i>velutina</i>		485
<i>linearifolia</i>		368	<i>Proclesia</i>	314, 446	
<i>loeseneriana</i>		382	<i>acuminata</i>		503
<i>longiflora</i>	362, 370		<i>alata</i>		509
<i>macrantha</i>		363	<i>benthamiana</i>		503
<i>multibracteata</i>		374	<i>bracteata</i>		490
<i>nervosa</i>		380	<i>capitata</i>		507
<i>nitida</i>	325, 326, 376, 378, 379, 381, 383		<i>cordata</i>		487
<i>ovata</i>		367	<i>cordifolia</i>		487
<i>pentaptera</i>	325, 326, 365		<i>hartwegiana</i>		489
<i>pilgeriana</i>		375	<i>melastomoides</i>		503
<i>poortmanni</i>		375	<i>pseudopubescens</i>		502
<i>popenoei</i>		374	<i>pubescens</i>		485
<i>pubiflora</i>	325, 372		<i>scabriuscula</i>		490
<i>pulchra</i>		384	<i>splendens</i>		505
<i>punctata</i>		371	<i>strobilifera</i>		509
<i>puberula</i>		371	<i>veraguensis</i>		461
<i>recurva</i>		382	<i>warszewiczii</i>		463
<i>reducta</i>		380	<i>Psammisia</i>	312, 314, 323, 325, 326, 332, 384	
<i>robusta</i>		378	<i>alpicola</i>		376
<i>rotundifolia</i>	366, 367		<i>bicolor</i>		401
<i>salapa</i>	325, 326, 372, 383		<i>breviflora</i>		387
<i>sodirol</i>	376, 377		<i>coarctata</i>	401, 508	
<i>speciosissima</i>	370, 384		<i>columbiensis</i>		398
<i>stricta</i>		364	<i>coriacea</i>		423
<i>tenuiflora</i>		362	<i>costaricensis</i>		377
<i>tovarensis</i>		404	<i>cyathifera</i>	384, 401	
<i> trianae</i>	376, 377		<i>ecuadorensis</i>		390
<i>tuberosa</i>		369	<i>elegans</i>		397
<i>turrialbana</i>		377	<i>elliptica</i>		395
Maycha.....		492	<i>engleriana</i>		401
Monte frutilla.....		483	<i>falcata</i>	384, 398, 399, 401	
Muelas.....	316, 378, 526		<i>ferruginea</i>		391
Mycerinus.....	326, 332, 359		<i>formosa</i>		420
<i>sclerophyllus</i>		359	<i>glabra</i>		377
Neothibaudia.....		323	<i>globosa</i>		388
Niedenzu.....		317	<i>graeberiana</i>		389
Notopora.....	314, 321, 330, 331, 334		<i>grandiflora</i>	392, 396	
<i>schomburgkiana</i>		335	<i>guianensis</i>	394, 399, 523	
<i>schomburgkii</i>		335	<i>hookeriana</i>	325, 404, 406	
Oreanthes.....	313, 329, 332, 358		<i>jessicae</i>		404
<i>buxifolius</i>		358	<i>killipii</i>		395
Orthaea.....	314, 327, 329, 330, 331, 333, 509, 518		<i>kraenzliniana</i>		390
<i>abbreviata</i>		517	<i>lanceolata</i>	398, 402	
<i>apophysata</i>		516	<i>lehmannii</i>	389, 421	

XII CONTRIBUTIONS FROM THE NATIONAL HERBARIUM

Psammisia—Continued.		Page		Page
<i>leucostoma</i>		399, 400	<i>Siphonostema</i>	355
<i>longicolla</i>		406	<i>costatum</i>	355
<i>longifolia</i>		414	<i>myrtifolium</i>	356
<i>macrophylla</i>		398, 402	<i>Socratesia</i>	446
<i>nitida</i>		376	<i>melastomoides</i>	454
<i>oblongifolia</i>		406	<i>Sophoclesia</i>	320
<i>penduliflora</i>	325, 403, 405, 406		<i>apophysata</i>	516
<i>pennellii</i>		386, 392	<i>Sphyrospermum</i>	320
<i>planchoniana</i>		403	<i>Splachnum</i>	471
<i>puberula</i>		390, 391	<i>Themistoclesia</i>	314, 323, 324, 333, 425, 439, 445
<i>pauciflora</i>		394, 400	<i>buxifolia</i>	340
<i>ramiflora</i>		392	<i>compacta</i>	444
<i>recurvata</i>		396	<i>coronilla</i>	344
<i>rhododelphis</i>		425	<i>dependens</i>	442
<i>rupestris</i>		376	<i>hirsuta</i>	443
<i>sarcantha</i>		404	<i>humboldtiana</i>	441, 442
<i>sclerophylla</i>		406	<i>lehmannii</i>	442
<i>sodirol</i>		397	<i>pendula</i>	324, 439, 441
<i>symphystemona</i>		392	<i>peruviana</i>	442
<i>tovarensis</i>		404	<i>pterocarpa</i>	449
<i>ulbrichiana</i>		405, 406	<i>vegasana</i>	440
<i>ulei</i>		399	<i>Thibaudia</i>	312, 313, 320, 321, 323, 324, 325, 327, 328, 329, 330, 332, 333, 352, 406, 410, 439, 509
<i>urbaniana</i>		401	<i>acuminata</i>	503
<i>urichiana</i>		393, 395, 400	<i>alata</i>	509
<i>weberbaueri</i>		401	<i>andrei</i>	418
<i>Pucapinchichu</i>		342	<i>angustifolia</i>	431, 438
<i>Pucosato</i>		438	<i>anomala</i>	429
<i>Puechato sumacmisqui</i>		438	<i>apophysata</i>	421
<i>Riedelia</i>		314, 519	<i>archeri</i>	426
<i>bahiensis</i>		522	<i>ardisiaefolia</i>	438
<i>clonantha</i>		525	<i>axillaris</i>	417
<i>fendleriana</i>		528	<i>bicolor</i>	401
<i>panurensis</i>		522	<i>biflora</i>	435
<i>warszewiczii</i>		525	<i>boliviensis</i>	437, 438
<i>Ruiz and Pavon</i>		312	<i>bracteata</i>	490
<i>Rusbya</i>	314, 317, 324, 333, 445		<i>breviflora</i>	387
<i>boliviana</i>		446	<i>capitata</i>	507
<i>pearcei</i>		446	<i>caulialata</i>	438, 509
<i>taxifolia</i>		324, 445	<i>cerander</i>	438
<i>Sagalita</i>		373, 490	<i>cinnamomifolia</i>	485
<i>St. Hilaire</i>		313	<i>coarctata</i>	401
<i>Salapa</i>		490	<i>cordifolia</i>	487
<i>Satyria</i>	314, 320, 330, 331, 333, 468, 519		<i>coronaria</i>	344
<i>breviflora</i>		530	<i>costaricensis</i>	425, 426, 427
<i>clonantha</i>		525, 526	<i>crassifolia</i>	457
<i>elongata</i>		521	<i>crenulata</i>	438
<i>grandifolia</i>		526	<i>cupatensis</i>	421
<i>latifolia</i>		468, 527	<i>cyathifera</i>	401
<i>meiantha</i>		528	<i>dependens</i>	442
<i>minutiflora</i>		529	<i>diphylla</i>	438
<i>neglecta</i>		520	<i>domingensis</i>	439
<i>nitida</i>		528	<i>elliptica</i>	356
<i>ovata</i>		524	<i>emarginata</i>	347
<i>panurensis</i>		400, 522	<i>engleriana</i>	416
<i>pilosa</i>		524	<i>falcata</i>	401
<i>toroi</i>		530	<i>floribunda</i>	410, 413, 415
<i>triloba</i>		523	<i>formosa</i>	420
<i>ulei</i>		522	<i>glandulifera</i>	422
<i>warszewiczii</i>		519, 522, 525, 527	<i>graeberiana</i>	433
<i>Semiramisia</i>	314, 329, 332, 348, 392		<i>harmsiana</i>	432
<i>karsteniana</i>		348	<i>hendersoni</i>	503
<i>speciosa</i>		348, 349	<i>herrerae</i>	435
<i>weberbaueri</i>		349	<i>hirsuta</i>	339
<i>Siphonandra</i>	312, 314, 321, 326, 327, 329, 332, 355		<i>hirtiflora</i>	382
<i>elliptica</i>		355, 356	<i>hookeri</i>	503
<i>pilosa</i>		355		

Thibaudia—Continued.	Page	Thibaudia—Continued.	Page
<i>involucrata</i>	423	<i>punctata</i>	480
<i>jahnii</i>	419	<i>punctatifolia</i>	480
<i>jessicae</i>	404	<i>quereme</i>	495
<i>jusslaei</i>	438	<i>racemosa</i>	407
<i>krugii</i>	439	<i>regularis</i>	436
<i>latifolia</i>	439	<i>rigidiflora</i>	418
<i>laurifolia</i>	369	<i>roraimae</i>	420
<i>laxa</i>	424	<i>rupestris</i>	376, 377
<i>lehmannii</i>	414	<i>sarcantha</i>	404
<i>longifolia</i>	414	<i>scabriuscula</i>	490
<i>macrocalyx</i>	416	<i>schlimiana</i>	438
<i>macrophylla</i>	398	<i>secundiflora</i>	512
<i>martii</i>	438, 509	<i>septemnervia</i>	485
<i>melastomoides</i>	454, 503	<i>serrata</i>	438
<i>mellifera</i>	313, 437	<i>spathulata</i>	434
<i>melliflora</i>	313, 410, 437	<i>speciosa</i>	349
<i>mexicana</i>	439	<i>strobilifera</i>	509
<i>microphylla</i>	340, 341	<i>subcrenulata</i>	439
<i>moricandi</i>	430, 439	<i>tarapotana</i>	476
<i>mucronata</i>	409	<i>tetragona</i>	439
<i>multiflora</i>	437	<i>tomentosa</i>	428
<i>nitida</i>	376	<i>truncata</i>	424
<i>nutans</i>	423	<i>tuberosa</i>	369
<i>oblongifolia</i>	485	<i>turbinata</i>	415
<i>obovata</i>	431	<i>urbaniana</i>	432
<i>oceanensis</i>	438, 439	<i>viridiflora</i>	482
<i>ovalifolia</i>	434	<i>wardii</i>	408
<i>ovata</i>	433	<i>weberbaueri</i>	431
<i>pachyantha</i>	415	<i>Tyria</i>	314, 325, 360
<i>paniculata</i>	426, 427	<i>salapa</i>	372
<i>panurensis</i>	522	<i>Uva</i>	526
<i>parvifolia</i>	428	<i>camarona</i>	316, 377, 489
<i>penduliflora</i>	403	<i>de anis</i>	489
<i>pennellii</i>	427	<i>de monte</i>	486
<i>phyllireaefolia</i>	430	<i>Vaccinium</i>	312, 319, 320, 410, 439, 446
<i>pichinchensis</i>	413, 414	<i>bicolor</i>	401
<i>glabra</i>	404	<i>melliflorum</i>	437
<i>portoricensis</i>	329, 354	<i>smilacifolium</i>	329, 354
<i>pubescens</i>	485	<i>subcrenulatum</i>	439
<i>parvifolia</i>	502		



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CONTRIBUTIONS
FROM THE
UNITED STATES NATIONAL HERBARIUM
VOLUME 28, PART 3

MARINE ALGAE OF THE
SMITHSONIAN-HARTFORD EXPEDITION
TO THE WEST INDIES, 1937

By WILLIAM RANDOLPH TAYLOR



SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM
WASHINGTON, D. C.

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UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1940

For sale by the Superintendent of Documents, Washington, D. C. Price 10 cents

ISSUED JUN 12 1940

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM
II

ISSUED JUN 13 1940

CONTENTS

	Page
Introduction.....	549
List of species.....	552
Myxophyceae.....	552
Chlorophyceae.....	552
Phaeophyceae.....	554
Rhodophyceae.....	555
Literature cited.....	560

MARINE ALGAE OF THE SMITHSONIAN-HARTFORD EXPEDITION TO THE WEST INDIES, 1937

By WILLIAM RANDOLPH TAYLOR

INTRODUCTION

THE Smithsonian-Hartford Expedition was made possible through the generosity of George Huntingdon Hartford, 3d, on his full-rigged ship, the *Joseph Conrad*. The scientific work was under the direction of Dr. Waldo L. Schmitt, of the U. S. National Museum, Smithsonian Institution, with G. Robert Lunz, Jr., of the Charleston Museum, assisting. They collected the algae that form the subject of this report. Dr. Schmitt's (1938, p. 57) popular account of the trip calls attention to the unique character of this voyage, for although scientific work done in fore-and-aft rigged craft is still common, even for considerable distances with or without auxiliary power, it is a very long time since an American biological expedition has operated from a square-rigged vessel. The itinerary of the 4,500-mile trip provided stops at 15 islands and occasions for important scientific collecting. For the opportunity to study the marine algae the writer is particularly indebted to Dr. Schmitt and the authorities of the Smithsonian Institution.

Of the 81 collections of which the writer is informed, 21 were recognized by the collectors as containing algae. Some were relatively unfruitful, but in excess of 130 numbers were segregated, and several species recognized as epiphytes or contaminants of masses of larger plants. Since the areas visited were in the region of most extensive West Indian phycological study, it is not surprising that there are no new species to report. However, there are numerous records new to the islands or island groups concerned.

The algae of the Bahamas were reported by Howe (1904, p. 164; 1920, p. 553; 1924, p. 351; and others), but there have been no considerable additions to the recorded collections from these islands since. Practically nothing was known of the algae of Hispaniola until collections were made there by C. H. Arndt and studied by the writer (Taylor and Arndt, 1929, p. 651), followed by additions chiefly collected by C. R. Orcutt (Taylor, 1933, p. 401). These almost all came from the southwestern peninsula, with a few from Cap-Haïtien, so that the additions from this station and those from Île de la Tortue

are very welcome. So far as the latter place is concerned the records are all new but should not be differentiated from those on the main island. Considerable unreported collections of Puerto Rican algae have been assembled by M. A. Howe, who did not publish much upon his work there during his life, although, with the earlier accounts, there are already quite a number of algae known from the island (Hauck, 1888, p. 457; Howe, 1903, p. 171, 1915, p. 219; Foslie and Howe, 1906, p. 577).

The algae of the Virgin Islands have probably had much more thorough field study than any other area in the West Indies; the notable report on this district by Børgesen (1913-1920) covers his and previous work. The algae of adjacent Beata Island have also been reported upon by him (Børgesen, 1924, p. 14). Martinique curiously missed the attention of the earlier French phycologists who so thoroughly explored other islands (particularly Schramm and Mazé, 1865, 1866; Mazé and Schramm, 1870-1877). However, more recently attention has been directed here (Hamel, 1929, p. 53; Hamel and Hamel-Joukov, 1931-1933), and a number of species have been attributed to it.

It is not inappropriate here to mention briefly the curious editions of the studies of Schramm and Mazé, for the determination of whose specimens the brothers Crouan, pharmacists and well-known phycologists of Brest, were largely responsible. By chance Dr. Schmitt at St. Thomas, Virgin Islands, found in the possession of a resident several old natural-history books, a list of which he communicated to the writer, among others. Noting an unexpected date attributed to an old account of Guadeloupe algae, the writer secured this book through the kindness of Dr. Schmitt, and when it arrived it proved to be an issue quite unknown to him. Through correspondence he determined it to be a second and almost unknown edition of the well-known "*Algues de la Guadeloupe*." The situation appears to be that the first edition was set in type, was printed on one side of the page in two columns, and was published in 1865 at Basse-Terre, Guadeloupe. It had one partial page of introduction, described or listed in some detail 449 algae, and named 13 diatoms. The authors are given as "A. Schramm et H. Mazé." The second edition is, except for the title page, an autographic one, lithographed on both sides of the paper, the lines running across the page, and was published in 1866 at Cayenne, French Guiana. The writer's copy was apparently, by the inscription, a gift from Schramm to P. Duchassaing. In the three pages of introduction we learn that the inception of the study of Guadeloupe algae is to be ascribed to Duchassaing. In this edition numerous changes and additions occur, to the effect that 502 algae (including 14 diatoms) are listed in some detail or described.

The third edition is printed from type across the page, on both sides of the paper. Its title-page claims that it is the "2e Édition," and it appeared at Basse-Terre in 1870-1877. The introductory matter is much more extensive, and 940 algae including diatoms are involved, but the descriptions of the various species, in the earlier editions too brief, are here yet more curtailed or omitted. However, the citations of localities for the several species are fortified by the mention of specimen numbers. One notes that the authorship is now ascribed to "H. Mazé et A. Schramm" and learns from the introduction (signed in all editions "H. M.") that Schramm was deceased. It is this edition, rare in the original, which has been reissued in facsimile, and which is well known. The earlier editions are likewise rare and, because of the inclusion of species descriptions, important to taxonomists. The misleading title-page on the third edition has caused phycologists to neglect the true second edition, which merits consideration. The writer is particularly indebted to Dr. Schmitt for the opportunity of securing this rare book, to A. E. Townsend and G. Tandy, of the British Museum (Natural History), London, for a photostat of a Paris copy of the first edition, and for information regarding the earlier editions to Dr. O. C. Schmidt, of Berlin, Dr. R. Lami, of Paris, and Dr. D. H. Linder, of Cambridge.

The algae of Barbados are known by reason of the work of Vickers (*loc. cit.*), particularly her beautifully illustrated "Phycologia Barbadosensis," which comprised selected Chlorophyceae and Phaeophyceae only. Earlier Dickie (1875, p. 146) and later Howe (1928, p. 186) also wrote on the algae of this island. Finally, and referring to all the islands visited by the expedition, one may mention the comprehensive but indiscriminating list of Murray (1888-1889), covering the previous publications on West Indian marine algae up to the date of his publication. Most of the species mentioned in the present paper are described, and many figured, in the present writer's volume on the "Marine Algae of Florida" (1928). Other islands at which the expedition stopped yielded no algae; this is the more regrettable since they were rather less known in this respect than those from which collections were brought.

LIST OF SPECIES

MYXOPHYCEAE

OSCILLATORIACEAE

Microcoleus tenerrimus Gomont.

HISPANIOLA*¹: On a reef at 1.0 meter, Île de la Tortue, Haiti (2 *in part*), 21 March 1937. Determined by the kindness of Dr. Francis Drouet.

Symploca hydroides Kützinger ex Gomont.

HISPANIOLA*: On a reef at 1.0 meter, Île de la Tortue, Haiti (2), 21 March 1937. Det. F. Drouet.

RIVULARIACEAE

Calothrix confervicola C. Agardh ex Bornet & Flahault.

VIRGIN ISLANDS*: Charlotte Amalia, St. Thomas, littoral and in tide pools as an epiphyte (58), 4 April 1937. Det. F. Drouet.

Dichothrix fucicola (Kützinger) Bornet & Flahault.

HISPANIOLA*: Epiphytic on *Digenia*, on a reef at 1.0 meter, Île de la Tortue, Haiti (3 *in part*), 21 March 1937. Det. F. Drouet.

CHLOROPHYCEAE

ULVACEAE

Enteromorpha flexuosa (Wulfen) J. Agardh.

VIRGIN ISLANDS: With a large sterile species of *Spirogyra* in a stream by Tucker Road, St. Thomas (129), 25 April 1937.

Ulva fasciata Delile.

MARTINIQUE: Littoral, Fort de France (109), 15 April 1937.

Ulva lactuca Linnaeus.

BARBADOS: On rocks and coral along shore, Pelican Island, Carlisle Bay (118), 19 April 1937.

VALONIACEAE

Anadyomene stellata (Wulfen) J. Agardh.

HISPANIOLA: On a reef at 1.0 meter, Île de la Tortue, Haiti (12), 21 March 1937. PUERTO RICO: Littoral and in tidepools, Fort San Gerónimo, San Juan Island (39), 28 March 1937.

Cladophoropsis membranacea (C. Agardh) Børgesen.

HISPANIOLA: On a reef at 1.0 meter, Île de la Tortue, Haiti (9), 21 March 1937. PUERTO RICO: Littoral and in tidepools, Fort San Gerónimo, San Juan Island (37 *in part*, 38), 27 March 1937. VIRGIN ISLANDS: Charlotte Amalia, St. Thomas (57), 4 April 1937; on the littoral of Banana Bay, Water Island, St. Thomas (123), 24 April 1937.

¹ Where a record is believed to be new to an island or island group, the name of the island or group is marked by an asterisk (*), but no special designation is made of minor new station records, of which there are many.

Dictyosphaeria cavernosa (Forsskål) Børgesen.

HISPANIOLA: On a reef at 1.0 meter, Île de la Tortue, Haiti (4 in part, 11), 21 March 1937; littoral near Dames Point, Cap-Haïtien, Haiti (26), 22 March 1937. **PUERTO RICO***: Littoral and in tidepools, Fort San Gerónimo, San Juan Island (40), 28 March 1937. **VIRGIN ISLANDS**: On a coral reef off Lagoon Point, St. John (68), 6 April 1937; on the littoral of Banana Bay, Water Island, St. Thomas (125), 24 April 1937.

This species was discussed and figured by the writer (1928, p. 72) as *Dictyosphaeria favulosa* (C. Agardh) Decaisne.

Valonia ocellata Howe.

PUERTO RICO: Littoral and in tide pools, Fort San Gerónimo, San Juan Island, (30), 7 March 1937.

Valonia ventricosa J. Agardh.

HISPANIOLA: On a reef at 1.0 meter, Île de la Tortue, Haiti (5), 21 March 1937. **VIRGIN ISLANDS**: On a coral reef off Lagoon Point, St. John (69), 6 April 1937; on the Middle Ground coral reef, St. Croix (83), 6 April 1937; on the littoral of Banana Bay, Water Island, St. Thomas (126), 24 April 1937.

CLADOPHORACEAE**Chaetomorpha brachygona** Harvey.

BARBADOS: Among rocks and coral along shore, Pelican Island, Carlisle Bay (113), 19 April 1937.

Cladophora fascicularis (Mertens) Kützinger.

BARBADOS: On rocks and coral along shore, Pelican Island, Carlisle Bay (114), 19 April 1937.

Cladophora fuliginosa Kützinger.

HISPANIOLA: On a reef at 1.0 meter, Île de la Tortue, Haiti (4 in part, 6, 12 in part), 21 March 1937; on a rocky point, Île de la Tortue (19), 21 March 1937.

DASYCLADACEAE**Cymopolia barbata** Lamouroux.

HISPANIOLA: On a rocky point, Île de la Tortue, Haiti (20), 21 March 1937.

BRYOPSIDACEAE**Bryopsis pennata** Lamouroux.

VIRGIN ISLANDS: On the Middle Ground coral reef at 0.5 meter, St. Croix, (75), 8 April 1937. **MARTINIQUE**: In the littoral, Fort de France (110), 15 April 1937.

CAULERPACEAE**Caulerpa crassifolia** (C. Agardh) J. Agardh.

HISPANIOLA*: Littoral near Dames Point, Cap-Haïtien, Haiti (23), 22 March 1937. **PUERTO RICO**: Dredged off the west shore, San Juan Harbor (47), 29 March 1937. **VIRGIN ISLANDS**: Charlotte Amalia, St. Thomas, dredged at 8-10 feet near the anchorage in the harbor (62), 5 April 1937.

Caulerpa racemosa var. *microphysa* (Weber-van Bosse) Taylor.

PUERTO RICO*: Littoral and in tide pools, Fort San Gerónimo, San Juan Island (31), 27 March 1937.

Caulerpa racemosa var. *clavifera* (Turner) Weber-van Bosse.

VIRGIN ISLANDS: Littoral and in tide pools on the eastern side of the harbor, Charlotte Amalia, St. Thomas (59), 4 April 1937.

Caulerpa sertularioides var. *brevipes* (J. Agardh) Svedelius.

VIRGIN ISLANDS: Littoral and in tide pools on the eastern side of the harbor, Charlotte Amalia, St. Thomas (58), 4 April 1937.

Caulerpa sertularioides var. *farlowii* (Weber-van Bosse) Børgesen.

PUERTO RICO*: Littoral and in tide pools, Fort San Gerónimo, San Juan Island (40), 28 March 1937.

CODIACEAE

Halimeda opuntia (Linnaeus) Lamouroux.

HISPANIOLA: On a reef at 1.0 meter depth, Île de la Tortue, Haiti (14), 21 March 1937. VIRGIN ISLANDS: Littoral and in tide pools on the eastern side of the harbor, Charlotte Amalia, St. Thomas (52), 4 April 1937; littoral of Banana Bay, Water Island, St. Thomas (127), 24 April 1937.

Halimeda simulans Howe.

VIRGIN ISLANDS: On a reef on the north side of Buck Island, St. Croix (97), 10 April 1937.

Halimeda tuna (Ellis & Solander) Lamouroux.

VIRGIN ISLANDS: On the Middle Ground coral reef at 0.5 meter, St. Croix (88), 8 April 1937.

Penicillus capitatus Lamarck.

HISPANIOLA: In sand on a reef with *Thalassia* at 1.0 meter depth, Île de la Tortue, Haiti (13), 21 March 1937. PUERTO RICO: Littoral and in tide pools, Fort San Gerónimo, San Juan Island (36), 28 March 1937. VIRGIN ISLANDS: On the Middle Ground coral reef at 0.5 meter, St. Croix (86), 8 April 1937; on a reef in Smith Bay, St. Thomas (130), 25 April 1937.

Udotea flabellum (Ellis & Solander) Howe.

PUERTO RICO: Littoral and in tide pools, Fort San Gerónimo, San Juan Island (29), 27 March 1937. VIRGIN ISLANDS: Reef in Smith Bay, St. Thomas (131), 25 April 1937.

PHAEOPHYCEAE

ASPEROCOCCACEAE

Colpomenia sinuosa (Roth) Derbés & Solier.

VIRGIN ISLANDS: At 0.5 meter on the Middle Ground coral reef, St. Croix (77), 8 April 1937.

Hydroclathrus clathratus (Bory) Howe.

VIRGIN ISLANDS: At 0.5 meter on Middle Ground coral reef, St. Croix (74), 8 April 1937.

Rosenvingea sanctae-crucis Børgesen.

MARTINIQUE: In the littoral, Fort de France (106), 15 April 1937.

DICTYOTACEAE

Dictyopteris delicatula Lamouroux.

HISPANIOLA: In the littoral near Dames Point, Cap-Haïtien, Haiti (22), 22 March 1937. PUERTO RICO: In the littoral or in tide pools, near Fort San Gerónimo, San Juan Island (31), 27 March 1937; dredged off the west shore

of San Juan Harbor (49), 29 March 1937. VIRGIN ISLANDS: At 0.5 meter on Middle Ground coral reef, St. Croix (73), 8 April 1937.

Dictyota cervicornis Kützting.

VIRGIN ISLANDS: At 0.5 meter on Middle Ground coral reef, St. Croix (76), 8 April 1937; reef, north side of Buck Island, St. Croix (99), 10 April 1937. MARTINIQUE: Dredged at 15–20 meters in Fort de France Harbor (111), 17 April 1937. BARBADOS: On rocks and corals along shore, Pelican Island, Carlisle Bay (117), 19 April 1937.

Dictyota dentata Lamouroux.

HISPANIOLA: At 1.0 meter on a reef, Île de la Tortue, Haiti (7), 21 March 1937. BARBADOS: On rocks and coral along shore, Pelican Island, Carlisle Bay (116), 19 April 1937.

Dictyota divaricata Lamouroux.

MARTINIQUE*: Dredged at 15–20 meters, Fort de France Harbor, 17 April 1937.

Dilophus guineensis (Kützting) J. Agardh.

HISPANIOLA: At 1.0 meter on a reef, Île de la Tortue, Haiti (8), 21 March 1937; rocky point on Île de la Tortue, Haiti (18), 21 March 1937.

Padina sanctae-crucis Børgesen.

HISPANIOLA: Rocky point on Île de la Tortue, Haiti (17), 21 March 1937. VIRGIN ISLANDS: Littoral and in tide pools, east side of the harbor, Charlotte Amalia, St. Thomas (53), 4 April 1937; on the beach and on weedy rocks, juvenile, Coral Harbor, St. John (66), 6 April 1937.

Padina vickersiae Hoyt.

HISPANIOLA*: In the littoral near Dames Point, Cap-Haïtien, Haiti (25), 22 March 1937. MARTINIQUE*: In the littoral, Fort de France Harbor (107), 15 April 1937.

FUCACEAE

Sargassum platycarpum Montagne.

HISPANIOLA: Littoral near Dames Point, Cap-Haïtien, Haiti (24), 22 March 1937. PUERTO RICO: In the littoral and in tide pools, juvenile, Fort San Gerónimo, San Juan Island (34), 27 March 1937. VIRGIN ISLANDS: On the beach and on weedy rocks, Coral Harbor, St. John (65), 6 April 1937; littoral, Judith Fancy Bay (94), 9 April 1937.

Sargassum polyceratium Montagne.

VIRGIN ISLANDS: Littoral and in tide pools, eastern side of the harbor, Charlotte Amalia, St. Thomas (54), 4 April 1937; at 0.5 meter on the Middle Ground coral reef, St. Croix (93), 8 April 1937.

Turbinaria tricostata Barton.

VIRGIN ISLANDS*: On the beach and weedy rocks, Coral Harbor, St. John Island (64), 6 April 1937.

Turbinaria turbinata (Linnaeus) Kuntze.

HISPANIOLA: On the reef at 1.0 meter, Île de la Tortue, Haiti (15), 21 March 1937. PUERTO RICO: Along shore in the littoral and in tide pools, Fort San Gerónimo, San Juan Island (28), 27 March 1937.

RHODOPHYCEAE

BANGIACEAE

Asterocytis ramosa (Thwaites) Gobi.

HISPANIOLA: At 1.0 meter on a reef, Île de la Tortue, Haiti (12), 21 March 1937.

CHAETANGIACEAE

Galaxaura cylindrica (Solander) Lamouroux.

VIRGIN ISLANDS: In the littoral at Judith Fancy Bay, St. Croix (95), 9 April 1937.

Galaxaura squalida Kjellman.

PUERTO RICO: Littoral and in tide pools, Fort San Gerónimo, San Juan Island (42), 28 March 1937. VIRGIN ISLANDS: At 0.5 meter on the Middle Ground coral reef, St. Croix (85), 8 April 1937.

Galaxaura subverticillata Kjellman.

VIRGIN ISLANDS: At 0.5 meter on Middle Ground coral reef, St. Croix (80), 8 April 1937. BARBADOS: On rocks and coral along shore, Pelican Island, Carlisle Bay (115), 19 April 1937.

GELIDIACEAE

Gelidiella acerosa (Forsskål) Feldmann & Hamel.

HISPANIOLA: At 1.0 meter on a reef, Île de la Tortue, Haiti (16), 21 March 1937. PUERTO RICO*: Littoral and in tide pools, Fort San Gerónimo, San Juan Island (32), 27 March 1937, and (37), 28 March 1937. VIRGIN ISLANDS: At 0.5 meter on Middle Ground coral reef, St. Croix (87), 8 April 1937, and on a reef on the north side of Buck Island, St. Croix (96), 10 April 1937.

Discussed and figured by the writer (1928, p. 143) as *Gelidium rigidum* (Vahl) Greville.

RHIZOPHYLLIDACEAE

Ochtodes secundiramea Montagne.

PUERTO RICO: Littoral and in tide pools, Fort San Gerónimo, San Juan Island (43), 28 March 1937.

CORALLINACEAE

MELOBESIEAE

Fosliella farinosa var. *solmsiana* (Falkenberg) Taylor. Pl. 20, fig. 2

HISPANIOLA: On *Valonia* at 1.0 meter on a reef, Île de la Tortue, Haiti (5 in part), 21 March 1937.

Discussed by the writer (1928, p. 211) as *Melobesia farinosa* var. *solmsiana* (Falkenberg) Lemoine.

Lithophyllum pustulatum (Lamouroux) Foslie.

VIRGIN ISLANDS*: At 0.5 meter on a Middle Ground coral reef, St. Croix (89), 8 April 1937.

Lithothamnion incertum Foslie.

BAHAMAS*: In the littoral, rocky point south of Cockburn Town, San Salvador (1), 19 March 1937.

Lithothamnion occidentale Foslie.

MARTINIQUE*: Dredged at 15-20 meters, Fort de France Harbor (121), 17 April 1937.

Melobesia membranacea (Esper) Lamouroux.

Pl. 20, fig. 1

HISPANIOLA*: On *Thalassia*, littoral on rocky point east of Tierra Baja Road, Île de la Tortue, Haiti (21), 21 March 1937. PUERTO RICO: On *Thalassia*, littoral near Fort San Gerónimo, west end of San Juan Island (44), 28 March 1937.

VIRGIN ISLANDS*: On *Thalassia* growing on the Middle Ground coral reef, St. Croix (90), 8 April 1937.

Melobesia membranacea (Taylor, 1937, p. 267) forms more or less gregarious crusts, which are often zonate, smooth, with moderately to very prominent domed to mammillate cystocarpic conceptacles with a small pore, and plane to slightly elevated flat tetrasporangial conceptacles, which are perforated by several to many pores through which the tetraspores emerge individually. After discharge the conceptacles of both types may lose their covers and become simply cavernous.

This species has not been frequently recorded from the eastern American coast. However, it is supposed to have been found in Massachusetts, Rhode Island, New York (Long Island), Jamaica, Puerto Rico, Guadeloupe, and Brazil. The exceptionally fine tetrasporiferous material brought by this expedition caused the writer to review the specimens available in his collection and those in the Collins Herbarium in the New York Botanical Garden, which were kindly lent for the purpose. The Collins New England specimens were in no case in a state that permitted confirmation of the records by the multipored tetrasporangial conceptacles, though perhaps sectioning would have given other conclusive information. One Florida specimen showed the tetrasporangial conceptacles clearly; the writer is not aware that the record was ever published. Then the writer reviewed his own material of *Fosliella farinosa* and *F. lejolisii* and there found much more *Melobesia* material admixed. In no case did he get any unmistakable *Melobesia* on the New England specimens. He secured several samples, mostly with *F. farinosa*, from his Florida and West Indies material. He is able to confirm from these the presence of this species in Florida*, Jamaica, Hispaniola, Puerto Rico, Virgin Islands, and Colombia. With one exception the *Melobesia* was found on *Thalassia* in the following collections:

FLORIDA: Key West, *E. Palmer* 39b, 1874 (Herb. N. Y. Bot. Gard.); Key West, *W. R. Taylor* 68a, 31 May 1925; Dry Tortugas Islands, off Laboratory Pier, Loggerhead Key, *W. R. Taylor* 421a, 18 June 1924; Dry Tortugas Islands, dredged at station 1 near Long Key, *W. R. Taylor* 185a, 1 July 1924; Dry Tortugas Islands, dredged at station 308 in shallow water near Bird Key, *W. R. Taylor* 1235a, June 1926; Dry Tortugas Islands, dredged at 6 meters at station 311 off East Key, *W. R. Taylor* 1252a, 10 June 1926. JAMAICA: Navy Yard, Port Antonio, *G. F. Papenfuss*, 2 July 1932. HISPANIOLA: Miragoane, Haiti, *C. H. Arndt*, 1 February 1929. COLOMBIA: Littoral and in tide pools, Old Providence Island, on *Cymodocea manatorum*, *W. L. Schmitt* 43a, 44, 6 August 1938.

CORALLINEAE

Amphiroa fragilissima (Linnaeus) Lamouroux.

PUERTO RICO: In littoral and in tide pools, Fort San Gerónimo, San Juan Island (38 in part), 28 March 1937. VIRGIN ISLANDS: Littoral and in tide pools, eastern side of the harbor, Charlotte Amalia, St. Thomas (56), 4 April 1937; on a coral reef off Lagoon Point, St. John (70), 6 April 1937; at 0.5 meter on the Middle Ground coral reef, St. Croix (72, 82 in part), 8 April 1937; on a reef, north side of Buck Island, St. Croix (98), 10 April 1937. MARTINIQUE: Littoral, Fort de France (120), 15 April 1927; dredged at 15–20 meters, Fort de France Harbor (122), 17 April 1937.

Corallina cubensis (Montagne) Decaisne.

HISPANIOLA: At 1.0 meter on a reef, Île de la Tortue, Haiti (4), 21 March 1937.

Jania adherens Lamouroux.

HISPANIOLA: At 1.0 meter on a reef, Île de la Tortue, Haiti (*4 in part*), 21 March 1937. PUERTO RICO*: Littoral and in tide pools, Fort San Gerónimo, San Juan Island (*37 in part*), 28 March 1937. VIRGIN ISLANDS: At 0.5 meter on Middle Ground coral reef, St. Croix (*82 in part*), 8 April 1937; on a reef on the north side of Buck Island, St. Croix (*98 in part*), 10 April 1937.

Jania capillacea Harvey.

HISPANIOLA: At 1.0 meter on a reef. Île de la Tortue, Haiti (*3 in part*), 21 March 1937. PUERTO RICO*: Littoral and in tide pools, Fort San Gerónimo, San Juan Island (*35 in part*), 27 March, and (*37 in part, 38 in part*), 28 March 1937. VIRGIN ISLANDS: Littoral and in tide pools, eastern side of the harbor, Charlotte Amalia, St. Thomas (*55*), 8 April 1937; reef on the north side of Buck Island, St. Croix (*98 in part*), 10 April 1937.

Jania pumila Lamouroux.

HISPANIOLA: Upon *Turbinaria* at 1.0 meter on a reef at Île de la Tortue, Haiti (*16 in part*), 21 March 1937.

GRATELOUPIACEAE

Grateloupia cuneifolia J. Agardh.

MARTINIQUE: In the littoral north of the fort, Fort de France (*105*), 15 April 1937.

RHODOPHYLLIDACEAE, *Incertae sedis?**Wurdemannia miniata* (Draparnaud ex DeCandolle) Feldmann & Hamel.

VIRGIN ISLANDS: Littoral and in tide pools, eastern side of the harbor, Charlotte Amalia, St. Thomas (*60*), 4 April 1937.

Discussed and figured by the writer (1928, p. 145) as *Wurdemannia setacea* Harvey.

HYPNEACEAE

Hypnea cervicornis J. Agardh.

VIRGIN ISLANDS: At 0.5 meter on the Middle Ground coral reef, St. Croix (*92*), 8 April 1937.

Hypnea musciformis (Wulfen) Lamouroux.

PUERTO RICO: Littoral and in tide pools, Fort San Gerónimo, San Juan Island (*51*), 29 March 1937. VIRGIN ISLANDS: On a reef on the north side of Buck Island, St. Croix (*101*), 10 April 1937.

GRACILARIACEAE

Gracilaria ferox J. Agardh.

VIRGIN ISLANDS: At 0.5 meter on the Middle Ground coral reef, St. Croix (*78*), 8 April 1937.

Gracilaria mamillaris (Montagne) Howe.

VIRGIN ISLANDS*: At 0.5 meter on Middle Ground coral reef, St. Croix (*89*), 8 April 1937. MARTINIQUE: Littoral, Fort de France (*103*), 15 April 1937.

CERAMIACEAE

Centroceras clavulatum (C. Agardh) Montagne.

PUERTO RICO: Littoral and in tidepools, Fort San Gerónimo, San Juan Island (35), 27 March 1937.

Spyridia filamentosa (Wulfen) Harvey.

MARTINIQUE: Littoral, Fort de France (104), 15 April 1937.

RHODOMELACEAE

Acanthophora spicifera (Vahl) Børgesen.

PUERTO RICO: Dredged off the west shore of San Juan Harbor (50), 29 March 1937. VIRGIN ISLANDS: Dredged at 8–20 feet from near the anchorage in the harbor, Charlotte Amalia, St. Thomas (63), 5 April 1937; at 0.5 meter on Middle Ground coral reef, St. Croix (79), 8 April 1937.

Bryothamnion triquetrum (Gmelin) Howe.

VIRGIN ISLANDS: At 0.5 meter on Middle Ground coral reef, St. Croix (81), 8 April 1937.

Digenia simplex (Wulfen) C. Agardh.

HISPANIOLA: At 1.0 meter on a reef, île de la Tortue, Haiti (3), 21 March 1937. PUERTO RICO*: Littoral and in tidepools, Fort San Gerónimo, San Juan Island (35), 27 March 1937.

Herposiphonia tenella (C. Agardh) Ambronn.

MARTINIQUE: Littoral, Fort de France (108), 15 April 1937.

Laurencia obtusa (Hudson) Lamouroux.

VIRGIN ISLANDS: At 0.5 meter on the Middle Ground coral reef, St. Croix (82), 8 April 1937; on a reef, north side of Buck Island, St. Croix (102), 10 April 1937; littoral, Banana Bay St. Thomas (124), 24 April 1937.

Laurencia papillosa (Forsskål) Greville.

PUERTO RICO: Littoral and in tidepools, Fort San Gerónimo, San Juan Island (27, 33), 27 March 1937. VIRGIN ISLANDS: On the beach and on weedy rocks, Coral Harbor, St. John (67), 6 April 1937; at 0.5 meter on Middle Ground coral reef, St. Croix (91), 8 April 1937.

Vidalia obtusiloba (Mertens) J. Agardh.

PUERTO RICO*: Dredged off the west shore of San Juan Harbor (46), 29 March 1937.

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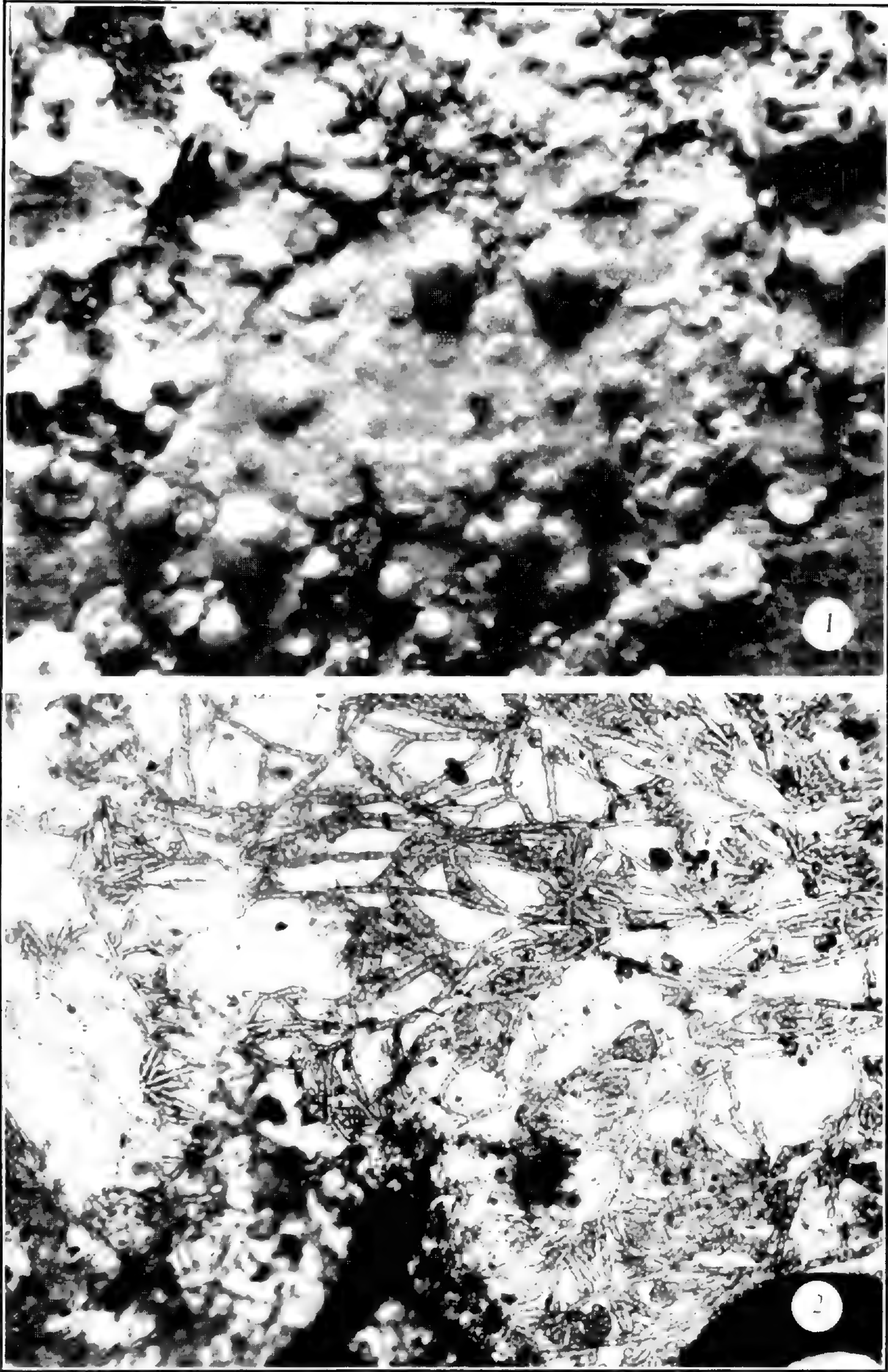
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EXPLANATION OF PLATE 20

1. *Melobesia membranacea*. Details of thalli bearing cystocarpic and tetrasporangial conceptacles. The pores in the latter have been retouched to make them show in the picture as reproduced. In printing for contour and detail it has been impossible to preserve the nearly white aspect of the thallus. Specimen from Île de la Tortue, $\times 35$.
2. *Fosliella farinosa* var. *solmsiana*. Filaments of the variety spreading over the membrane of *Valonia ventricosa*. In this specimen there is almost no tendency to form radiating disk thalli; this is an extreme form of the variety. The very great fragility of the plant makes it difficult to secure in a place suitable for photographing by transmitted light, and practically impossible to secure flat over a large area. Specimen from Île de la Tortue, $\times 65$.



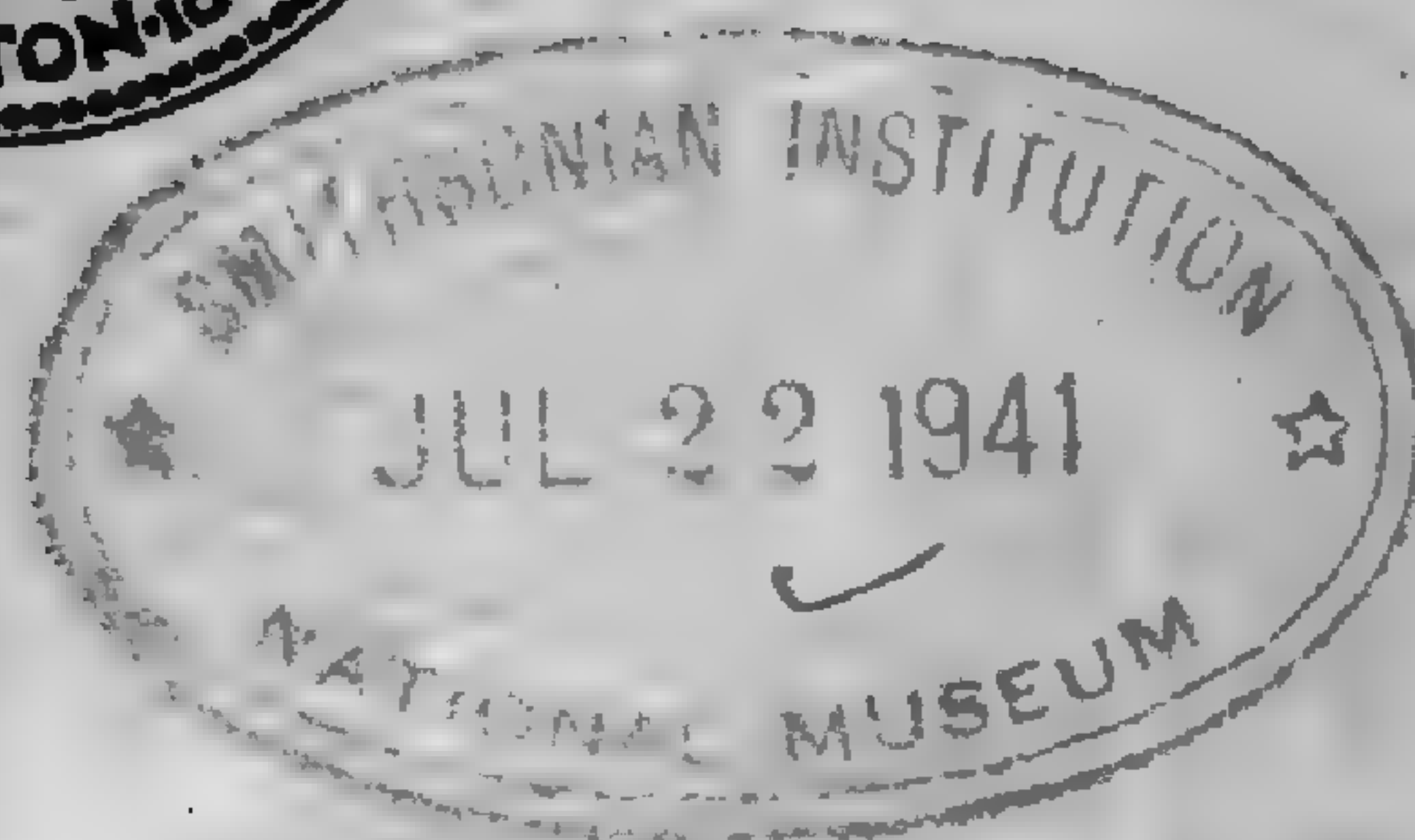


MELOBESIA AND FOSLIELLA.

CONTRIBUTIONS
FROM THE
UNITED STATES NATIONAL HERBARIUM
VOLUME 28, PART 4

PLANTS COLLECTED BY R. C. CHING
IN SOUTHERN MONGOLIA AND
KANSU PROVINCE, CHINA

By EGBERT H. WALKER



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UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1941

For sale by the Superintendent of Documents, Washington, D. C. Price 30 cents

ISSUED JUL 22 1941

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM

II

PREFACE

This paper, by Dr. Egbert H. Walker, aide in the National Herbarium, deals with the plants collected in southern Mongolia and Kansu Province, China, in 1923 by R. C. Ching, who was employed to conduct the botanical work of the National Geographic Society's second scientific expedition in central China under the direction of Dr. F. R. Wulsin. It consists of a systematic enumeration of the species collected, with field notes by the collector, together with Mr. Ching's report on the work of the botanical party and an account of the vegetation of Kansu Province. The collection, consisting of 1,158 numbers (with many duplicates), was presented to the National Museum, and has been identified by Dr. Walker, with the exception of the special groups mentioned.

Mr. Ching's explorations, together with those of Reginald Farrer (1914-15) and, more recently, Dr. Joseph F. Rock (1925-27), Kinshen Hao (1930), and others, have added so much to our knowledge that Kansu Province can no longer be called the botanically least known part of China. These collections and observations are important records of an interesting and diverse vegetation, which is rapidly disappearing with the steady destruction of the forests.

WILLIAM R. MAXON,
Curator, United States National Herbarium

CONTENTS

	Page
Introduction.....	563
Survey of botanical exploration in Kansu.....	565
Principal publications on Kansu, mostly botanical.....	566
Localities visited.....	568
Report of the expedition. By R. C. CHING.....	573
Organization of the expedition.....	574
Route of the botanical party.....	575
Wang Yeh Fu to Ningsia.....	575
Lanchow to Hsi Ning.....	576
Hsi Ning to Old T'ao Chou.....	578
Old T'ao Chou to Cho Ni.....	581
Cho Ni to Lanchow.....	584
General observations.....	585
The vegetation of Kansu.....	585
Principal botanical areas.....	588
Ho Lan Shan.....	589
Lien Ch'eng.....	590
Old T'ao Chou.....	591
Lien Hua Shan.....	592
Systematic enumeration of species.....	593
Index.....	vii

ILLUSTRATIONS

FIGURE	Page
144. <i>Juncus exploratorum</i> Walker, sp. nov.: Whole plant, fruiting head, and seeds.....	601

PLATES	Facing Page
21. Map of Kansu and Inner Mongolia, showing route of R. C. Ching in 1923.....	564
22. A, R. C. Ching supervising the loading of a pack mule with botanical equipment. B, The ethnological party halting for lunch on the Tibetan grasslands.....	572
23. A, One of the many canals on the great Ningsia Plain on the north side of the Yellow River, where much rice is grown. B, A small temple at the desert's edge south of Chung Wei Hsien.....	573
24. A, The Golden Stupa of Labrang. B, Some of the temples of Labrang with surrounding hills.....	580
25. A, The city of Old T'ao Chou with its surrounding barren hillsides ter- raced and cultivated almost to the summit. B, The T'ao Ho look- ing downstream from the top of a ridge in the T'ao Valley showing the forested hills.....	581
26. A, The Shih Men, or Rock Gate, into Tebbu Land, worn by the "Kaichou" or "Wutu" through a limestone barrier at 9,700 feet altitude. B, The Great Shih Men, or Great Rock Gate, leading into Tebbu Land in the Min Shan Range at 11,500 feet altitude.....	588
27. The densely forested Ta Kou, or Big Gorge, southwest of the Tibetan village A Chüan.....	589

PLANTS COLLECTED BY R. C. CHING IN SOUTHERN MONGOLIA AND KANSU PROVINCE, CHINA

By EGBERT H. WALKER

INTRODUCTION

IN 1923 the National Geographic Society sent Dr. F. R. Wulsin to China to conduct its Central China Expedition. The objective was to collect ethnological, zoological, and botanical material and to make a general survey preparatory to more intensive exploration at a later time. The personnel of the expedition was drawn from various Chinese institutions, R. C. Ching, the botanist, coming from Southeastern University (now National Central University), Nanking. The expedition assembled in March at Pao T'ou, Mongolia, at the end of the Peking-Suiyuan Railroad, on the Yellow River, and proceeded by the camel route leading northwest, west, and south to Wang Yeh Fu, the capital of the territory of A La Shan, Mongolia. The first collections were made at Pao T'ou. At Wang Yeh Fu Mr. Ching's party left the main group and followed a botanically more promising but rougher route to Ningsia. The whole expedition traveled together from there to Lanchow, where the botanical party again followed a separate circuit to the north, west, and south as far as Cho Ni. Meanwhile the anthropological and zoological parties went west to Hsi Ning and Lake Kokonor. On returning they traveled south from Hsi Ning across the western Kansu grasslands to Cho Ni, where they were rejoined by the botanical party. All traveled together to Lanchow, arriving at the end of September. From there the expedition floated down the Yellow River on a raft to Pao T'ou, and then returned by rail to Peking. No botanical collections were made after leaving Lanchow. Mr. Ching employed a resident mule driver in the Ho Lan Shan, Mongolia, to collect plants after the expedition left that region in the spring. These specimens, over 100 in number, were received by Mr. Ching on his return and were added at the end of his series.

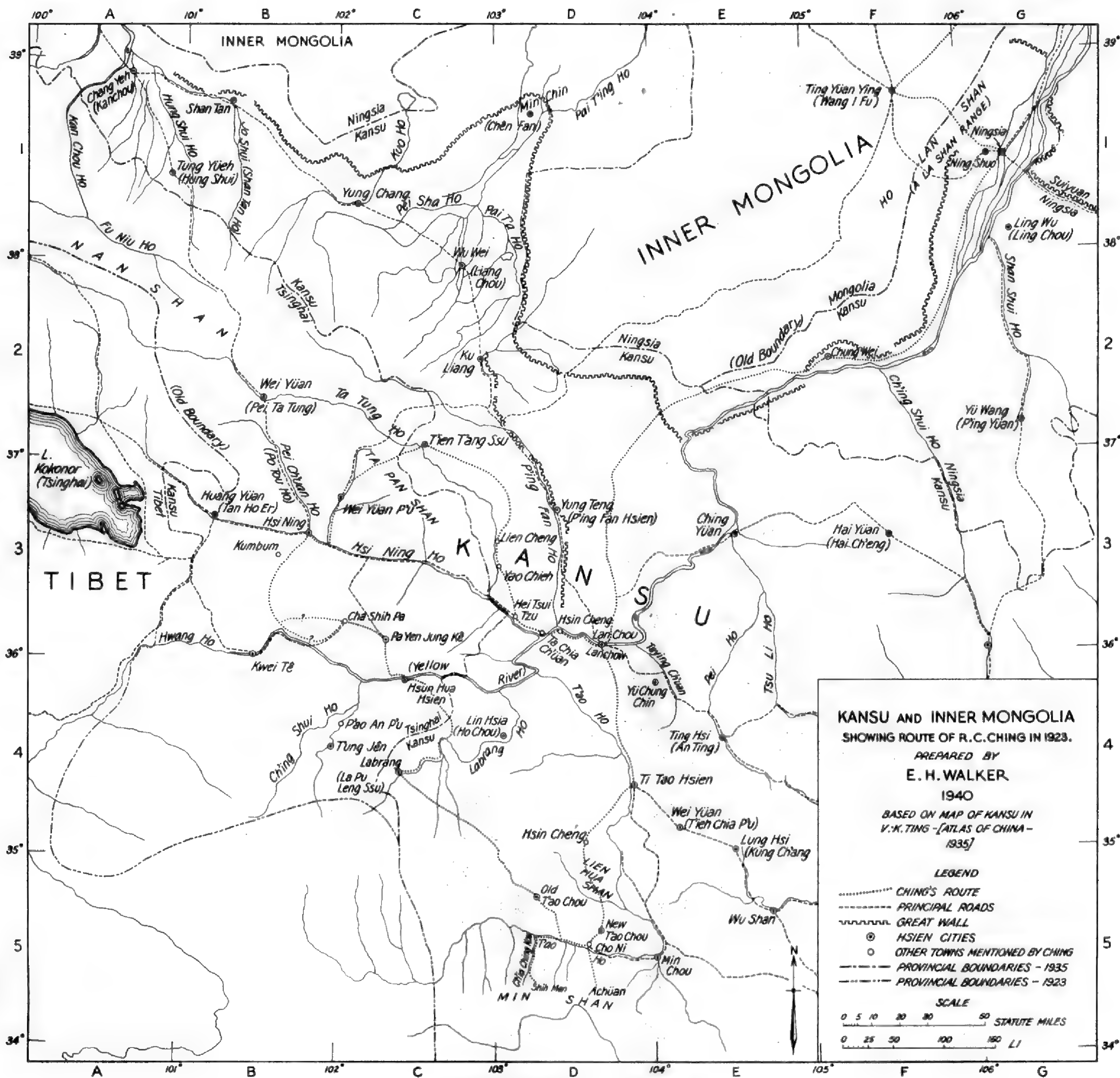
The 1,158 numbers of botanical specimens, with numerous duplicates, were presented by the National Geographic Society to the United States National Museum, and the duplicates were distributed later to various institutions the world over. The pteridophytes were determined by Dr. Carl Christensen and enumerated in 1927 (1).¹

¹ See bibliography, p. 566.

The field labels, prepared by Mr. Ching to accompany the specimens, bear unusually full and interesting notes, which are made available to students of the flora of this relatively little known part of China in the present enumeration. Since the collector's report, which was extracted from his daily journal, also contains much valuable information on the expedition and on the flora, it is published here with little modification. The bulk of the collection was named by the following specialists or their associates: Oakes Ames (Orchidaceae), E. B. Babcock (*Crepis* and relatives), G. Becker (*Viola*), G. Bonati (*Pedicularis*), Fêng-huei Ch'ên (*Saussurea*, in part), L. Diels (various families), W. E. Evans (various families), F. Fedde (*Corydalis*), H. Fröderström (*Sedum*, in part), R. Görz (*Salix*, in part), R. Gross (*Carex*, in part), H. Handel-Mazzetti (most of the Compositae), Kin-shen Hao (*Salix*, in part), H. Hara (*Chrysosplenium*), H. Harms (Araliaceae), A. Heimerl (*Achillea*), A. S. Hitchcock (most of the Gramineae), I. M. Johnston (Boraginaceae), Y. L. Keng (Gramineae, in part), K. Krause (Liliaceae, in part), C. V. B. Marquand (Gentianaceae, in part), J. Mattfeld (Compositae, in part), M. Onno (*Aster*, in part), C. H. Ostenfeld (Ranunculaceae, in part), F. W. Pennell (Scrophulariaceae, in part), E. Peter-Stibál (*Astragalus*, *Oxytropis*), F. Petrak (*Cirsium*, in part), R. Pilger (*Plantago*), K. H. Rechinger, fil. (*Rumex*), A. Rehder (woody plants, in part), P. L. Ricker (*Lespedeza*), O. E. Schulz (Cruciferae), W. W. Smith (Primulaceae), G. L. Stebbins (*Ixeris* and relatives), A. N. Steward (*Polygonum*), T. Tang (Liliaceae and Orchidaceae, in part), E. Ulbrich (Araliaceae, Ranunculaceae, in part, etc.), Fa-tsuan Wang (Liliaceae and Orchidaceae, in part), L. O. Williams (Orchidaceae, in part), and E. H. Wilson (woody plants, in part). The remainder of the collection was named by the writer. Because of the existing confusion in many genera of Chinese plants, such as *Astragalus* and *Oxytropis*, some specimens are determined only to genera.

The photographs here reproduced are selected from those made by F. R. Wulsin, supplemented by four others (pls. 4, *B*; 5, *A* and *B*; and 6) taken by J. F. Rock in 1925. The former are reproduced through the courtesy of the National Geographic Society, the latter with the kind permission of the Arnold Arboretum.

This collection represents 2 families, 12 genera, and 22 species of pteridophytes and 81 families, 318 genera, and 767 species of seed plants. About 25 new species and new varieties have been based on Ching's Kansu specimens. Most of the new species have already been described in various publications, but the present enumeration includes three original descriptions. Mr. Ching's collection adds much to our previous rather meager knowledge of the flora of this interesting province.



SURVEY OF BOTANICAL EXPLORATION IN KANSU

Kansu Province is crossed by the principal trade routes from Peking to Turkestan and Tibet. Many travelers have explored the region, but not many have made botanical collections. The first botanical explorers were Russians, the most important being N. M. Przhevalski, G. N. Potanin, and P. J. Piasetski,² whose collections made during the period from 1871 to 1886 were studied by C. J. Maximowicz. Many new species based on these collections have been described by him in the publications of the Russian Academy of Sciences. He also began an enumeration of these collections (16, 17), but his series was never completed. The collections made by L. Lóczy on the expedition from 1877 to 1880 by the Hungarian Count Béla Széchenyi were enumerated by A. Kanitz (13, 14). In 1898 K. Fütterer led an expedition into central Asia, which included Kansu in its itinerary. The collections made by the leader were enumerated by L. Diels (3), who also published an enumeration of the collections of the Filchner expedition in 1903-05 (4). The small collection made by the Japanese botanist Tsunobu Umemura around Lanchow in 1905 was enumerated in Japanese by S. Matsuda (15). The French archeological expedition led by P. Pelliot, with L. Vaillant as botanist, collected over 1,100 numbers of specimens on its trip from the Pamir across central Asia through Kansu and Shensi in 1906-08. An enumeration was prepared by P. Danguy (2). In 1911 William Purdom (22) made horticultural collections in southern Kansu and in 1914-15 accompanied the better-known horticultural explorer Reginald Farrer into the same territory. Farrer also explored the central and western part of the province and published two popular books and several reports on his work (5-10). Although he collected herbarium material, this was incidental to his major interest, and no enumeration has been issued. The American horticultural explorer Frank N. Meyer was in the province in the autumn of 1917. The well-known French explorer for the Musée Hoangho Paiho de Tientsin, Père E. Licent, made collections in 1918-19, the new species from which were published from time to time by the late H. Handel-Mazzetti. As yet no full enumeration of this collection has been issued.

The next botanical expedition was that by R. C. Ching in 1923, of which this paper is an account. From 1925 to 1927 Joseph F. Rock explored the province for the Arnold Arboretum of Harvard University, making large herbarium collections as well as gathering living material for planting abroad. His herbarium collections have been enumerated by A. Rehder, E. H. Wilson, and C. E. Kobuski (23, 24).

² Of the 767 species in the present enumeration 109, or 14 percent, were first described from the collections made by these three Russians in this region.

In 1930 the Chinese botanist Kin-shen Hao accompanied the Chinese-Swedish expedition from Szechwan to the Kokonor region through Kansu, and published an enumeration of his collection and an account of the vegetation in 1938 (12). The latest collections from Kansu seem to be those of Fenzel and Trippner in 1935, from which several new species have been described by H. Handel-Mazzetti.

PRINCIPAL PUBLICATIONS ON KANSU, MOSTLY BOTANICAL ³

1. CHRISTENSEN, C. On a small collection of pteridophytes from the province of Kansu, China. *Journ. Washington Acad. Sci.* **17**: 497-501. 1927.
An enumeration of Ching's collections.
2. DANGUY, P. Mission Pelliot-Vaillant dans l'Asie centrale. Collections botaniques rapportées par le Dr. L. Vaillant. Liste des espèces. *Bull. Mus. Hist. Nat. (Paris)* **17**: 260-272, 331-346, 446-453. 1911.
This expedition crossed Kansu.
3. DIELS, L. Beschreibung der auf der Forschungsreise durch Asien gesammelten Pflanzen. *In* K. Futterer, *Durch Asien* **3**: 1-24. *pl.* 1-4. 1903.
A systematic enumeration of collections from Mongolia, Kansu, and Tibet.
4. ———. Botanische Ergebnisse. *In* Wissenschaftliche Ergebnisse der Expedition Filchner nach China und Tibet 1903-1905, **10**: 245-273. 1908.
An enumeration of collections.
5. FARRER, R. J. Report of work in 1914 in Kansu and Tibet. *Journ. Hort. Soc. (London)* **42**: 47-114. *fig.* 14-18. 1916.
A description of the region, with a list of all plants of which seeds were collected.
6. ———. Report of work in 1915 in Kansu and Tibet. *Journ. Hort. Soc. (London)* **42**: 324-348. *fig.* 62. 1917.
A continuation of the preceding.
7. ———. The Kansu marches of Tibet. *Geogr. Journ. (London)* **49**: 106-124. 1917.
A description of his first year of exploration.
8. ———. On the eaves of the world. 2 vols., 1917; ed. 2, 2 vols., 1926.
An account of the first part of his exploration in Kansu.
9. ———. My second year's journey on the Tibetan border of Kansu. *Geogr. Journ. (London)* **51**: 342-359. 1918.
10. ———. The rainbow bridge. 383 pp. 1921.
An account of the second part of his exploration in Kansu.
11. FUTTERER, K. Verzeichnis der während der Reise gesammelten Blütenpflanzen und Flechten. *In* his *Durch Asien* **3**: 25-37. 1903.
A chronological enumeration of collections from Mongolia, Kansu, and Tibet.
12. HAO, KIN-SHEN. Pflanzengeographische Studien über den Kokonor-See und über das angrenzende Gebiet. *Bot. Jahrb. Engler* **68**: 515-668. *pl.* 63-65. 1 folded map. 1938.
A description and enumeration with a bibliography.
13. KANITZ, A. Die botanischen Resultate der centralasiatischen Expedition des Grafen Béla Széchenyi. *Bericht. Math. Naturw. Ungarn* **3**: 1-15. 1885.
A summary of collections. A summary of the next entry.

³ Additional botanical references on both Kansu and Mongolia may be obtained from E. D. Merrill and E. H. Walker, *A bibliography of eastern Asiatic botany*, xlii+719 pp. 1938.

14. KANITZ, A. A növenytani gyűjtések eredményei Gróf Széchenyi Béla keletázsiai utjából (1877–1880). (Plantarum in expeditione speculatoria comitis Béla Széchenyi a Ludovico de Lóczy in Asia centrali collectarum enumeratio.) *In* Graf Béla Széchenyi, Keletázsiai utjának tudományos eredményei czimű munka 2: 789–852. *pl.* 1–7. 1891.
An enumeration in Hungarian. A German edition also has been published.
15. MATSUDA, S. A list of plants collected in Lan-chou, Kansu, by Tsugunobu Umemura. *Bot. Mag. Tokyo* 23: (24)–(30), (55)–(64). 1909.
A systematic enumeration.
16. MAXIMOWICZ, C. J. Flora Tangutica, sive Enumeratio plantarum regionis Tangut (Amdo) Provincia Kansu, nec non Tibetiae praesertim, orientali-borealis atque Tsaidam, ex collectionibus N. M. Przewalski atque G. N. Potanin. Fasc. 1: Thamniflorae et Disciflorae. xviii + 110 + 4 pp. 31 *pl.* 1889.
The incomplete botanical part of a natural history based on their collections.
17. ——— Enumeratio plantarum hucusque in Mongolia nec non adjacentē parte Turkestaniae sinensis lectarum. Fasc. 1, iv + 138 + [8] pp. 14 *pl.* 1889.
This is the incomplete vol. 2, fasc. 1, of the natural history of Przewalski's and Potanin's collections.
18. POTANIN, G. N. Tangutsko-Tibetskaia Okraina Kitaia, i tsentral'naia Mongolia, puteshestvie G. N. Potanin 1884–1886. [The Tangut-Tibet border region of China and central Mongolia.] 2 vols. 1893.
This general traveler's account in Russian contains a list of vernacular names with Latin equivalents.
19. PRZHEVALSKI, N. M. Mongolia, the Tangut country and the solitudes of northern Tibet; being a narrative of three years' travel in eastern High Asia. Translated by E. D. Morgan, with introduction and notes by Colonel H. Yule. 2 vols. 1876.
This includes general observations on the vegetation. The original was in Russian. A German edition has also been published.
20. ——— Iz Zaisana cherez Khami v Tibet i na verkhov'ia Zheltoi Riēki. (Tret'e puteshestvie v Tsentral'noi Azii.) [From Zaisan through Khami to Tibet and the head-waters of the Yellow River. (Third expedition through central Asia.)]. iv+ii+473 pp. 2 *maps*. 118 *illustr.* 1883.
A general account with botanical observations in chapters 15 and 16. A German edition has also been published.
21. ———. Ot Kiakhty na istoki Zheltoi Riēki, izslēdovanie sēvernoi okrainy Tibeta i put' cherez Lob-nor po basseinu Tarima. [From Kiakhta to the headwaters of the Yellow River; exploration of the northern border-line of Tibet, and the journey through Lobnor, along the basin of the river Tarim.] iii+536 pp. 29 *illustr.* 3 *maps*. 1888.
This account of his fourth expedition contains general observations.
22. PURDOM, W. Plant-collecting in China by Mr. Purdom. *Gard. Chron.* III. 54: 229–231. *figs.* 82–85. 1913.
General observations on the vegetation of Kansu and the Tibetan border.
23. REHDER, A., and WILSON, E. H. An enumeration of the ligneous plants collected by J. F. Rock on the Arnold Arboretum expedition to north-western China and northeastern Tibet. *Journ. Arn. Arb.* 9: 4–27, 37–125. *pl.* 12, 13. 1928; 13: 385–409. 1932.
24. REHDER, A., and KOBUSKI, C. E. An enumeration of the herbaceous plants collected by J. F. Rock for the Arnold Arboretum. *Journ. Arn. Arb.* 14: 1–52. 1933.

25. ROCK, J. F. The land of the Tebbus. *Geogr. Journ.* **81**: 108-127. *12 pl. 1 text map.* 1933.
An account of exploration.
26. TING, V. K.⁴ [New atlas of the Chinese Republic.] 1935.
An atlas in Chinese only, on which the map (pl. 21) accompanying this paper is based.
27. WULSIN, F. R. Non-Chinese inhabitants of the province of Kansu, China. *Amer. Journ. Phys. Anthropol.* **8**: 203-320. *1 text map.* 1925.
A report by the ethnologist of the expedition of which R. C. Ching was the botanist.
28. ———. The road to Wang Ye Fu. An account of the work of the National Geographic Society's Central-China expedition in the Mongol kingdom of Ala Shan. *Nat. Geogr. Mag.* **49**: 197-234. *illustr.* 1926.
A popular account of the first part of this expedition.

LOCALITIES VISITED

Most of the locality names mentioned in Mr. Ching's report and in this enumeration have been transliterated according to the Wade system, with the assistance of Dr. A. W. Hummel, of the Library of Congress, and Dr. Dean R. Wickes, of the Soil Conservation Service of the United States Department of Agriculture. The names of provincial capitals are given according to the postal romanization. The characters were largely furnished by Mr. Ching from his field notes and from the field labels accompanying the specimens, supplemented by reference to the Chinese atlas by Ting (26), the base from which the map (pl. 21) accompanying this paper was drawn. Since the geographic names on the printed labels, which were prepared for mounting with the herbarium specimens, were not romanized by the Wade system, these names are added in italics in the following list of localities. Names for which no characters have been found are given in quotation marks. The numbers given after the explanation of the location of these places indicate the collector's numbers on the specimens obtained in that locality.

The designation of some places as in Mongolia or in Kansu is attended by some difficulties due to the change of the boundary line when the Inner Mongolian provinces of Suiyuan and Ningsia were established, subsequent to 1923. When Mr. Ching made this trip, the northern boundary of Kansu was considered to pass north of the Yellow River and through the Ho Lan Shan. Thus the city of Ningsia was in Kansu, rather than in Inner Mongolia as now considered.

The list of localities follows:

- A Chüan** (*Archuen*), 阿絹, south of Choni, T'ao Chou Hsien. This is the Chinese equivalent of the Tibetan name A-E-Nar (sometimes given as Adjuan), a village and region 90 li south of Cho Ni. (See map, D-5.) Nos. 970-992.

⁴ 中華民國新地圖

Cha Shih Pa, 札什巴, northwest of Pa Yen Jung Kê. (See map, C-3, and report, p. 580.)

Chen Fan Ch'üan Tzu, 鎮番泉子, Wu Yüan Hsien, Inner Mongolia. North of the great bend in the Yellow River. Nos. 11-14.

Chen Mu Kuan, 鎮木關, Ho Lan Shan. Nos. 164-166.

Chi Cha Ssu, 鷄榨寺. A monastery east of Kuei Tê (see report, p. 579).

Ch'ia Ch'ing Kou (*Kar Ching K'ou*), 卡清溝, T'ao Chou Hsien. A valley extending south from the T'ao Ho into the Min Shan and containing the village of Ch'ia Ch'ing and a route to Shih Men and to the Tebbu country. (See map, D-5.) (This is apparently called "Kadja Ku" by Rock.) Nos. 824-881, 888, 935-954, 1157.

Chia Ku K'ou, 嘉谷口, Inner Mongolia. No. 24.

Ch'ia Te Kou, 卡德溝, Ho Lan Shan. Nos. 157, 159.

Ch'ien Kou, 乾溝, enroute from Cho Ni to Lanchow. Nos. 1007, 1011-1013, 1030, 1037, 1045.

Ch'ien K'ou, 錢口, Wu La Shan, Inner Mongolia. Nos. 2-4.

Ch'ing Kang Yai, 清岡崖, P'ing Fan Hsien. Nos. 565-577.

Cho Ni (*Choni*), 卓泥, T'ao Chou Hsien. (See map, D-5.) This was the residence of the Prince of Choni, who governed a large area until 1928. (The location given on Ting's map is not in conformity with that given on the maps of various botanical explorers. This may be due to political changes, for a partial account of which see pp. 110-111 of Rock's paper (25). Playfair uses the name 卓尼.) Nos. 993-1004.

Chung Wei (*Chungwei*), 中衛, Inner Mongolia. A city about half way between Ningsia and Lanchow. (See map, F-2.) Nos. 212-223, 226-237.

Gargannar. See Shih Men.

Ha Ho, 哈河, enroute from Cho Ni to Lanchow. Nos. 1015, 1022, 1042, 1044.

Ha La Hu Kou, 哈拉湖溝. A valley on the northwest side of the Ho Lan Shan range, its mouth 30 li from Wang Yeh Fu. Nos. 46-78.

Ha Ta Men River (*Hatamen*), 哈達門, Wu La Shan, Inner Mongolia. West of Ch'ien Kou. Nos. 5-6.

Hei Tsui Tzu, 黑嘴子. On north bank of Hsi Ning Ho near the Yellow River. (See map, D-3, and report, p. 576.)

Ho Lan Shan, 賀蘭山, Mongolia. (See map, F-1.) A well-wooded range. Ting gives A La Shan Mountain as 阿拉善山 as an alternative name. Nos. 201-207, 291, 1047-1156.⁵

⁵ Nos. 1047-1156 were collected by a resident mule-driver who was employed by Mr. Ching to collect plants after the latter had gone on farther west. They are labeled as Ho Lan Shan, Ningsia, without more precise localities. In this enumeration they are designated only as collected in Ho Lan Shan.

Hsi Ch'iao Ssu, 喜鵲寺. A lamasery north of the Yellow River in Kuei Tê Hsien. No. 730.

Hsi Mi Yai, 細米崖, P'ing Fan Hsien. Nos. 460, 478-505.

Hsi Ning (*Sining*), 西寧. An important trading city on the Hsi Ning Ho. (See map, B-3.)

Hsi Yeh Kou, 錫葉溝, Ho Lan Shan. Nos. 160-163, 167-185.

Hsin Ch'eng, 新城. There are three towns with this name designated as follows:

1. Northwest of Ningsia. Nos. 208-211.
2. Seventy li west of Lanchow on the north bank of the Yellow River. (See map, D-3.) Nos. 302-304, 308-309.
3. South of Lanchow on the route from Cho Ni. (See map, D-4.) Nos. 1005-1006, 1031-1033, 1040, 1043.

Hsün Hua Hsien (*Hsün Hwa Hsien*), 循化縣. On the south bank of the Yellow River. (See map, C-4.) Nos. 731-739.

Hua Hsi Kou, 華溪溝, Ho Lan Shan. No. 79.

Huang Hsi Kou, 黃溪溝, Ho Lan Shan. (Ting's map gives Hua Hsia K'ou, 華峽口, which may be the place designated by Ching.) Nos. 194-200.

Hung Yang Tung, 洪陽洞, Lang Shan, Inner Mongolia. A village. Nos. 17-20.

I T'ai K'uei, 義太魁, Wu Yüan Hsien, Inner Mongolia. A town. No. 15.

Jargannar. See Shih Men.

"Kan Ku You." A village 120 li north of Cho Ni and south of Lien Hua Shan. (No characters are available.) (See report, p. 592.)

Kokonor (Chinese—Ch'ing Hai 青海). (See map, A-3.)

Kuei Tê Hsien, 貴德縣. A city on the Yellow River. (See map, B-3.)

Kumbum. A famous monastery south of Hsi Ning, known locally as T'a Er Ssu, 塔兒寺. (See map, B-3.)

"Kwa Shan," 60 (?) li south of Lanchow. Nos. 1035, 1041.

La Chi Tzu Shan (*La Che Tzu Shan*), 拉鷄子山, Hsi Ning Hsien. South of Kumbum. (See report, p. 579.) Nos. 686-723.

La Ch'iung Kou (*La Chang K'ou*), 拉穹溝, Hsi Ning Hsien, north of Hsi Ning City. Nos. 600-641.

La Pu Lông Ssu, 拉卜楞寺, or Labrang. A famous lamasery and trading center. (See map, C-4.) Ting gives the new name of this place as Hsia Ho, 夏河. Nos. 770-780.

Labrang. See the preceding name.

Lanchow, 蘭州. The capital of Kansu Province. (See map, D-3.) Ting gives the new name as Kao Lan, 皋蘭. Nos. 239-240, 244-245, 1046.

- Lang Shan** (*Lon Shan*), 狼山, Inner Mongolia. A crescent-shaped range of mountains north of the big bend in the Yellow River. Ting gives this as an alternate name for Yin Shan, 陰山, the new name. No. 16 and others.
- Lang Tzu T'ang Kou** (*Lan Ze Cheon K'ou*), 廊子堂溝, Hsi Ning Hsien. A gorge in the Ta P'an Shan, extending 120 li west of the Ta T'ung Ho. (See report, p. 578.) Nos. 578-599.
- Lien Ch'eng** (*Lichen*), 蓮城, P'ing Fan Hsien. (See map, D-3.) Thirty-two numbers between 278 and 455.
- Lien Hua Shan** (*Lian Hwa Shan*), 蓮花山. A large mountain range inside the bend of the T'ao Ho. (See map, D-5, and report, pp. 584, 592.) Fifteen numbers between 1008 and 1158.
- Liu Fu Yai**, 柳府崖, P'ing Fan Hsien. A mountain pass between Lien Ch'eng and T'ien T'ang Ssu. Nos. 458-459, 461-477.
- Lung Hua**, 龍華 or 隆窪. A half Tibetan village between Labrang and Old T'ao Chou. (See report, p. 581.) Nos. 781-815.
- Malisoondo**. See next name.
- Ma Li Sung Tu**, 馬利松渡. A Chinese transliteration of the Tibetan Malisoondo. A gorge 16 li long on the north side of the Min Shan range south of the T'ao Ho. (See report, p. 583.) Nos. 882-887, 889-890, 944.
- Min Chou Hsien**, 岷州縣. (See map, E-5.)
- Min Shan**, 岷山. A large range south of the T'ao Ho. (See map, D-5.)
- Nan Ssu Kou**, 南寺溝, Ho Lan Shan. A valley on the southern side of the range wherein is situated a large lamasery. Nos. 131-156, 158-159.
- Nei Mu Kun**, 內木棍. A market village 40 li south of Hsün Hua Hsien. (See report, p. 580.)
- Nei Wu**, 內烏. A Mohammedan country north of Old T'ao Chou en route from Labrang. The lamasery of Nei Wu Ch'iu Ssu is located here. (See report, p. 581.)
- Ni Ma Lang Kou** (*Ni Mar Lan K'ou*), 尼馬郎溝. A valley between Hsün Hua Hsien and Labrang. Nos. 742-768.
- Ningsia**, 寧夏. A large city on the Yellow River. (See map, G-1.) Nos. 224-225.
- Pa Yen Jung Kê**, 巴燕戎格. A *hsien* city north of the Yellow River. (See map, C-3, and report, p. 580.) No. 741.
- Pai Yang Wen**, 白陽汶, in Ni Ma Lang Kou, en route to Labrang.
- Pan Ch'iao**, 板橋, T'ao Chou Hsien. No. 1014.
- Pao T'ou**, 包頭, Inner Mongolia. A large city at the end of the Peking-Sui Yüan Railway. No. 1.
- Pei Ssu Kou**, 北寺溝. A valley 10 li long on the north side of the Ho Lan Shan range, its mouth 6 li from Shui Mo Kou. Here is situated a large lamasery. Nos. 106-125, 186-193.

- P'ing Fan Hsien** (*Pingfan*), 平番縣. On the P'ing Fan Ho north of Lanchow. (See map, D-3.) Ting gives Yung Têng 永登 as the new name.
- San Ta Lai Ssu** (*Sun Dar La Tze*), 三達賴寺, Hsi Ning Hsien. A lamasery near the Yellow River below Kuei Tê Hsine. (See report, p. 579.) Nos. 724-729.
- Shang Hsin Chuang** (*Chian Shing Cheon*), 上新庄, Hsi Ning Hsien. Sixty li south of Hsi Ning and 10 li east of Kumbum. (See report, p. 578.) Nos. 677-685.
- Shih Men**, 石門, or Jargannar, or Gargannar. A pass or gateway in the Min Shan range leading to the "Tebbu" country. (See map, D-5, and report, p. 582.) Nos. 891-934.
- Shui Ch'ü**, 水曲, Wu Yüan Hsien, Inner Mongolia. Nos. 7, 8.
- Shui Mo Kou**, 水磨溝. The largest valley in the north side of the Ho Lan Shan range, being 40 li long and parallel to [and next west of Ha La Hu Kou. Nos. 84-105.
- Shui Mo Kou** (*Hsia Mo K'ou*), 水磨溝, near Lien Ch'eng, P'ing Fan Hsien. Fifty-four numbers between 311 and 482.
- "**Suan Sun Miar**," a village on the north slope of the Lien Hua Shan range, 120 li south of Ti Tao Hsien. (See report, p. 592.)
- Suiyüan**, 綏遠, Inner Mongolia. Capital of Suiyüan Province. (See report, p. 574.)
- Sung P'an** 松潘, northeastern Szechwan. (See report, pp. 580, 584.)
- Ta Chia Ch'üan**, 達家川. A town at the confluence of the Hsi Ning Ho and the Yellow River. (See map, D-3, and report, p. 576.)
- Ta P'an Shan** (*Dar Pan*), 大盤山, Hsi Ning Hsien. A mountain range about 80 li east of Hsi Ning. (See map, C-3, and report, p. 577.) Nos. 642-675.
- Ta Shui Kou**, 大水溝, Lang Shan, Inner Mongolia. Nos. 22-23.
- Ta T'ung Ho**, 大通河. A river. (See map, B-C-2.)
- T'a Er Ssu**, 塔兒寺. See Kumbum.
- T'ai Hua** (*Ta Hwa*), 泰華, P'ing Fan Hsien. Nos. 506-558.
- Tai Wang Kou** (*Tai Hwang K'ou*), 戴王溝, Lien Ch'eng, P'ing Fan Hsien. Nos. 439-448, 451, 454.
- T'ao Chou Chiu Ch'eng** (*Old Taochow*), 洮州舊城. (See map, D-5.)
- T'ao Chou Hsien**, 洮州縣. This *hsien* district includes the new and old cities of T'ao Chou and Cho Ni, as well as the south side of the Min Shan range.
- T'ao Chou Hsin Ch'eng** (*New Taochow*), 洮州新城. (See map, D-5.)
- T'ao Ho**, 洮河. A river. (See map, D-5.)
- Ti Shui Kou**, 滴水溝, Inner Mongolia. No. 21.



A, R. C. Ching supervising the loading of a pack mule with botanical equipment.
B, The ethnological party halting for lunch on the Tibetan grasslands.



A, One of the many canals on the great Ningsia Plain on the north side of the Yellow River, where much rice is grown.

B, A small temple at the desert's edge south of Chung Wei Hsien.

- Ti Tao Hsien**, 狄道縣. A city on the Tao Ho, 道河 where the route from Cho Ni to Lanchow crosses. (See map, D-4.) (Ting's map gives this as Lin T'ao 臨洮.)
- T'ien T'ang Ssu** (*Ti Taon Sse*), 天堂寺, P'ing Fan Hsien. A lamasery and town on the Ta T'ung Ho. (See map, C-2.) This has been called by various travellers "Cheterton" and on some maps is given as "Ti Town Su." Nos. 559-564.
- Ting Yüan Ying**. See Wang Yeh Fu.
- T'u Er P'ing** (*Toul Ping*), 土兒坪, P'ing Fan Hsien. A mountain 10 li north of Lien Ch'eng. Sixty-three numbers between 338 and 457.
- Tu I Kou**, 杜一溝, T'ao Chou Hsien. A valley south of Cho Ni and the T'ao Ho, extending to A Chüan. This is called Tayü Ku by Rock. Nos. 955-969.
- Wa P'ing Hsiang**, 瓦瓶鄉, 35 li south of Lanchow. Nos. 1023, 1029.
- Wang Te Lin Kou**, 王得林溝, Ho Lan Shan. Nos. 80-83.
- Wang Yeh Fu**, 王爺府, or Ting Yüan Ying, 定遠營, Inner Mongolia. An important town north of the Ho Lan Shan range. (See map, F-1.) Nos. 25-45, 126-130.
- Wei Yüan P'u**, 威遠堡, about 90 li north of Hsi Ning. (See map, C-3, and report, p. 578.) The new name of this city is Hêng Chu, 互助.
- "Woo Chi,"** Hsi Ning Hsien. No. 676.
- Wu Ch'uan Shan**, 五泉山. "A hill, now a public park, 7 li south of the city of Lanchow"—R. C. Ching. No. 238.
- "Wu La Koo Do,"** Wu Yüan Hsien, Inner Mongolia. No. 9.
- Wu La Shan**, 烏拉山, Inner Mongolia. A small mountain range just west of Pao T'ou and north of the Yellow River
- Wu Yüan Hsien** (*Wu Ye Hsien*), 五原縣, Inner Mongolia. West of Pao T'ou. No. 10.
- Yang She**, 楊舍, en route from Cho Ni to Lanchow. No. 1039.
- Yao Chieh** (*Yao Kai*), 窖街. A town 30 li south of Lien Ch'eng, P'ing Fan Hsien. (See map, D-3, and report, p. 577.) Forty-eight numbers between 241 and 300.
- Yeh Ts'ang Kou** (*Ye Cheon K'ou*), 葉倉溝, T'ao Chou Hsien. Near Old T'ao Chou. Nos. 816-823.

REPORT OF THE EXPEDITION

By R. C. CHING

Early in the spring of 1923 F. R. Wulsin came from the United States to China to conduct his second scientific expedition in Central China under the auspices of the National Geographic Society. The purpose of this expedition was to collect zoological and botanical

specimens for the Society, with photographic work as an important adjunct. It was my privilege to join him as a botanist, on recommendation of Prof. W. Y. Chun, then at Southeastern University (now National Central University), Nanking.

The expedition was in the field for eight months, from early March to late October 1923, of which time about half was spent in mere travel, the remainder in field work. Since Kansu is such a large area, too large by far to be covered in one season, our work was of necessity extensive rather than intensive and may be considered a preliminary survey. We observed the essential characteristics of the flora and located regions worthy of intensive study at some future time. The specimens collected will contribute materially to our knowledge of this botanically least-known province of China. This collection was made in part of Inner Mongolia and northern and western Kansu, over a route of approximately 8,600 li,⁶ beginning and ending at the town of Pao T'ou, 300 li west of the city of Suiyüan, now capital of the Inner Mongolian province of that name. The total collection comprises 1,158 numbers, of which about two-fifths are woody. About one-fifth of the woody plants are arborescent, the rest shrubby. This shows the general character of the vegetation of northwestern China proper, since Kansu may be considered as a typical province of this section of the country. The area studied, especially the western part, was fascinating in every respect, nearly everything being new to me. The following extracts from my journal are restricted largely to the botanical work and observations.

ORGANIZATION OF THE EXPEDITION

All the members of the National Geographic Society's expedition traveled as a single unit until they reached Wang Yeh Fu (Ting Yüan Ying), Mongolia. There I left the expedition for a 2½ weeks' exploration of Ho Lan Shan, rejoining the party at Ningsia and journeying with it to Lanchow, the capital of Kansu.^{6a} There the expedition divided into two parties, one headed by Mr. Wulsin for zoological work, the other under my direction for botanical work. These two groups explored separate fields for three months, reuniting at Lanchow in October, before returning by way of the Yellow River.

The organization of the botanical party was very simple. During my 18 days on Ho Lan Shan, a mountain between Wang Yeh Fu and Ningsia, the party consisted only of myself, a servant, and a driver. Four donkeys carried the collecting outfit, provisions, and personal belongings. The donkey driver, being a local man, besides attending and driving the animals, acted as a guide and carrier during this period

⁶ One li equals about one-third English mile.

^{6a} Mr. Ching prepared a separate report on this side journey, which I have edited and sent to him with the suggestion that he publish it in China.—E. H. W.

in the mountains. The servant, Chinese by birth, had lived in Mongolia for over 10 years and spoke the Mongolian tongue perfectly. This man dried specimens and cared for my belongings, besides doing some very crude cooking.

The botanical party on leaving Lanchow was composed of myself, one servant, and two mule drivers with four mules and one donkey of the very best breed. The added personnel and equipment were necessary to care for extra supplies, because we were to be for some months in regions where even ordinary provisions were hardly obtainable, to say nothing of paper and other necessities required for botanical work. (See pl. 22, A.) The four mules carried all our load, about one-third being food, the remainder consisting of clothing, bedding, and the collecting outfit. One mule carried a much lighter load so that in case the servant or a mule driver became tired or sick he could ride without hindering the progress of the party. The donkey, the property of the servant from Mongolia, proved to be very helpful, enabling me to ride whenever I became tired of walking.

Six days from Lanchow a local guide from Lien Ch'eng was obtained. At Pa Yen Jung Kê he was replaced by a native of that town, a Mohammedan, who remained with the expedition for the rest of the trip. His tolerably good knowledge of the Tibetan language proved an invaluable aid in southwestern Kansu, where that tongue predominates. The mule drivers also rendered much faithful assistance with the field collecting and with the indoor work, thus making it unnecessary to hire additional help. The first principle in organizing a party is to keep the personnel as small as possible without endangering the objectives of the trip. This requires a high type of experienced, willing, and intelligent workers. My party was of the right size, but the men, although diligent, did not know how to work carefully and intelligently.

ROUTE OF THE BOTANICAL PARTY

Section 1: Wang Yeh Fu to Ningsia, distance 140 li.—There are two routes between these cities, one a cart road, the other a trail. We chose the latter, a shorter but more difficult route traversable in two instead of three days. The cart route lay 100 li or more farther south and was said to be broad and level but was reported to be of less botanical interest. We left Wang Yeh Fu, altitude 4,900 feet, on May 9. The first half day's journey was a steady ascent to the ridge of the Ho Lan Shan, altitude 8,260 feet, largely through Ha La Hu Kou. Here was the first real verdure seen after 40 days' travel in the Mongolian desert. About halfway to the top we passed an inn and guardhouse manned by a dozen Mongolian soldiers. Although my peculiar dress aroused suspicions in these guardians of the route, I was released after a half-hour of cross-examination. From the summit the way followed along the flank of a bare debris-strewn slope

for several li, then began an abrupt and rough descent, finally entering a gorge 40 li in length. The path here was the worst we found in all Kansu. The boulders underfoot were abominably slippery, and huge fallen rocks were everywhere. On emerging from the gorge we found a village of some 30 scattered farmhouses and a couple of miserable inns, of which we chose the better for the night's rest.

The next day's journey was far easier. It lay for the first 50 li over a gravel-strewn foothill and then passed over a level cultivated country known as the Ningsia Plain, an important rice-producing area of Kansu.⁷ (See pl. 23.) Ten li northwest of Ningsia we passed the badly neglected city of Hsin Ch'eng or "New City." Although we arrived at Ningsia at 7:30 in the evening, it was late at night before we could find a decent inn.

The two days' journey thus far had been so hard that our animals were unable to get on their legs the next day. We had found the vegetation along the trail very sparse because of the exposure and dryness. The longer route would have been better because less fatiguing and more comfortable.

Section 2: Lanchow to Hsi Ning, distance 800 li.—The whole expedition arrived in Lanchow (altitude 6,200 feet) on June 20. There are two official routes to Hsi Ning, a cart road and a mule trail. The former lay some distance north of the Hsi Ning Ho, passing through P'ing Fan Hsien, about 170 li from Lanchow. Eight days were required for this route. The mule trail lay along the north bank of the Hsi Ning Ho and required only six days, although the traveling was much more difficult. Inns were available at the end of each day's journey along both routes, but the accommodations were very poor.

We chose, however, neither of these regular routes, but a third way, which coincided with the mule trail for 200 li from Lanchow and then followed a very obscure path, seldom traversed by merchants because of its rugged character. It had been reported to us as passing through thickly wooded mountainous country inhabited by Tibetans and aborigines of an obscure origin. The other routes were said to be absolutely bare and not botanically interesting.

The route from Lanchow first followed the south bank of the Yellow River for a day and a half. There is a government ferry at Hsin Ch'eng, on the south bank, 70 li from Lanchow, but the muleteers insisted on crossing at Ta Chia Ch'üan, 30 li farther on at the junction with the Hsi Ning Ho, for reasons I could not determine. Thence we followed the north bank of the Hsi Ning Ho for another day and a half. Hei Tsui Tzu, a market village almost entirely inhabited by Mohammedans, was our stopping place after our third day's march.

The route now left the river and turned northwestward, first ascending steeply a mountain range 8,200 feet in altitude. Following

⁷ See explanation of provincial boundary changes, p. 568.

this was a gentle descent for about 40 li through a glen with steep clay cliffs on each side. At the end of this stretch was Yao Chieh, a town of considerable commercial importance and our halting-place for the night.

Yao Chieh is situated on the north bank of the Ta T'ung Ho, in a broad and level valley hemmed in on all sides by high bare mountains. The town is one of the great pottery-manufacturing centers of Kansu, enormous quantities of earthenware products of various kinds being turned out annually. It also boasted a copper and iron smelting plant, which, however, suspended operations over 10 years ago because of failure of the ore supply. Part of the abandoned buildings are now occupied by an apparently prosperous match-making company. The match-sticks are made from two species of poplar, locally abundant.⁸

Early the next afternoon we arrived at Lien Ch'eng, altitude 6,500 feet, after an easy march of 40 li along the Ta T'ung Ho. The whole valley is a vast agricultural country of fertile soil provided with an ample water supply from the river. Wheat is the staple crop, though barley, poppy, beans, and fruits are by no means scarce. The people here seemed more prosperous than in any of the country traversed since we left Lanchow.

Lien Ch'eng is on the southern side of a densely wooded area extending as far as the Ta P'an Shan. Here began the most extensive collecting thus far undertaken. The route followed was difficult, running largely through valleys and gorges with swift torrents or over mountain ridges. Without our competent guide from Lien Ch'eng we surely would have strayed from the obscure path and become lost. There were inns at regular intervals, but they offered the worst of accommodations, being filthy, dark, wet, and unsanitary, scarcely better than pigpens.

Because of its alpine character, the country is agriculturally poor. Not a single acre of level land was seen, but here and there on gentle slopes or in clearings barley and peas were raised, these constituting apparently the sole means of livelihood of the people. Pasturage was much in evidence. Herds of yaks, cows, sheep, goats, horses, and mules, grazing lazily in the wilderness, were more numerous than the inhabitants.

Tibetans predominate between Lien Ch'eng and Ta P'an Shan, the whole area being owned by them. Unlike their countrymen in the southwestern part of the province, they are not agriculturists. They lease the land, however, to Chinese at a very low rate paid in kind. Animal breeding and wild-game hunting are probably the chief occupations.

⁸ Only one species, however, is represented in Mr. Ching's collections from that region, *Populus suaveolens*.—E. H. W.

Of the whole journey from Lien Ch'eng to Hsi Ning we agreed that the worst was that section between Tien T'ang Ssu and Ta P'an Shan. The way led uphill for 120 li through a gorge known as Lang Tzu T'ang Kou, from an altitude of 7,810 feet at its mouth to about 11,100 feet at its upper end in the Ta P'an Shan. The torrent in the gorge, zigzagging down to the Ta T'ung Ho, caused us the most trouble. We crossed and recrossed the swift water as often as 25 times in going 60 li. After crossing the Ta P'an Shan and following another gorge down for about 50 li, we again entered an agricultural country where all the surrounding hills of gentle gradient were under cultivation, wheat and rape being the principal crops. The farmers were all of aboriginal origin, as was shown by the headdress worn by the women. In other respects they resembled the Chinese. They present an interesting ethnological problem, as little light has ever been thrown on their origin. In the city of Wei Yüan P'u, about 90 li northeast of Hsi Ning, they are found in greatest number.

Our party arrived at Hsi Ning, altitude 7,760 feet, on July 29, after following down an almost straight valley for over 100 li, and crossing the Hsi Ning Ho at a public ferry about 3 li south of the city. We were all glad to have traversed successfully this section of the journey, having been a month en route. About two thirds of the time had been devoted to collecting, with an accumulation of over 400 numbers.

Section 3: Hsi Ning to Old T'ao Chou; distance, 930 li.—Our first concern on arriving at Hsi Ning was to get the collections properly dried and packed in wooden boxes for shipment to Lanchow. They had, of course, been dried on the way, but they were re-dried at the end of each section of the journey before being packed for shipment, lest they mold en route. After this came the more serious problem of determining our next destination. Before leaving Lanchow we had tentatively planned to include Kokonor or Ch'ing Hai and Kuei Tê in our field of exploration. However, we learned authentically at Hsi Ning that these regions are comparatively poor botanically, consisting of vast steppes with an almost complete absence of woody plants. Accordingly, I decided to go directly to T'ao Chou in southern Kansu, where it was generally considered we should find more profitable fields. The choice of route proved to be a difficult problem, settled only after two full days of consultation. There were two possible trade routes, but as they offered practically no opportunity for botanical work we rejected both. The route finally selected proved in the end to be the most satisfactory one we could have chosen from the meagre information available. It is shown on the accompanying map, plate 21.

At noon on August 4, our party, as previously organized, left the south gate of Hsi Ning for Shang Hsin Chuang, a market village at an altitude of 9,710 feet, 60 li to the south, and our resting place for the

night. The road followed up a shallow valley, with dome-topped hills absolutely bare of vegetation lining both sides. A stream flowing north to the Hsi Ning Ho somewhat impeded our progress at frequent intervals. Farm villages and hamlets were frequently passed, and all the land among the foothills appeared devoted to agriculture. Poplars (closely allied to *Populus simonii*) surrounded every farmstead. Kumbum, the largest Tibetan lamasery in the vicinity of Hsi Ning (known locally as T'a Er Ssu), was said to be only 10 li west of Shang Hsin Chuang. I would have visited it, had we started the day's march earlier.

We set out the following morning at daybreak, as we were told the way ahead was difficult. We ascended gradually for some 40 li to the summit of the grass-clad La Chi Tzu Shan at an elevation of 11,210 feet on the north side of the Yellow River. Our route was the main road to the city of Kuei Tê on the other side of the river. Turning to the east we were brought by a sharp descent of 20 li into a well-wooded country with a pure Tibetan population. Since no inn of any kind was available at night, and as we were told the Tibetans never receive any strangers in their houses, we camped in a thick spruce forest in a valley by the lama temple called San Ta Lai Ssu, altitude 9,710 feet. From there we could see scattered Tibetan houses, or huts of black rugs, extending far up on the foothills, and herds of grazing yaks, cows, and horses.

Twenty li farther east in the same valley we arrived at a Tibetan farm village, altitude 8,410 feet, consisting of about 25 families. This was called Chi Cha Ssu, named after the large lamasery nestling on the right side of the valley at the northwest corner of the village. We found here for the first time Tibetans engaged largely as farmers. Wheat is their principal crop. They are governed by a Tibetan prince known as Now-So Dar-Ren, who shortly after our arrival came to call upon us. I presented him with a package of brown sugar and a piece of brick tea wrapped in red paper, for which he expressed in his face great appreciation. In return his servant brought us a cup of Tibetan butter and a piece of light-green cheesecloth, the latter, as we learned later, being a typical Tibetan present.

The inn in which we stayed was a flat-roofed Tibetan house kept by a Chinese from Hsi Ning. On the advice of the guide and mule drivers, I finally went to call on the prince at his yamen, in order to obtain his patronage and protection for our party while traveling in his territory. The Tibetans are said to be notorious barbarians and to pay no regard to strangers of any sort, unless the latter are properly guarded by the prince or hold a certificate from him. The yamen was undoubtedly the most magnificent and artistic building I saw in this part of the country. My mission was fully successful,

the prince giving me his personal card with a written statement in Tibetan, quite unintelligible to me.

Since the flora here was a repetition of what we had seen, we soon departed for Cha Shih Pa,⁹ altitude 10,210 feet, a populous Mohammedan town 95 li northeast of Chi Cha Ssu. The whole region was very mountainous, with scarcely any agriculture. The town lay on an important trade route from Hsi Ning to Pa Yen Jung Kê, a *hsien* city 60 li to the southeast, our destination the following day.

Pa Yen Jung Kê, altitude 9,700 feet, had only a few inhabitants, largely Mohammedans, and has been raised to the rank of a *hsien* only since the establishment of the Republic of China. We stayed here one day to procure a new guide, as the man from Lien Ch'eng was no longer familiar with the route. The new guide, obtained through the innkeeper, was a Mohammedan and proved to be a very useful man, as before mentioned.

The next day a gentle ascent followed by an abrupt descent of 70 li brought us over a mountain with an altitude of 10,800 feet and down to the Yellow River beyond. Twenty li to the east we crossed the river to Hsün Hua Hsien, altitude 6,600 feet, a newly built city but already in a dilapidated condition with fewer inhabitants than Pa Yen Jung Kê. The inhabitants in this vicinity are "Sar Lar," a people of Mohammedan religion, but of a distinct racial origin and with a language of their own. They are said to be savages, though those we met on the way were innocent farmers.

Forty li to the south of this city¹⁰ we arrived at a market village, altitude 8,800 feet, called Nei Mu Kun, with an almost pure "Sar Lar" population. This village, probably the last on the extreme southern boundary of the *hsien*, stood at the mouth of a valley. It marked the entrance to a Tibetan country stretching away as almost uninterrupted grassland as far south as the neighborhood of Sung P'an, in extreme northwestern Szechwan. We entered the Tibetan grasslands with great dread, as we had been told all along the way of the savage and bloodthirsty character of these Tibetans. It was normally a two days' journey of 100 li over this wilderness to La Pu Lêng Ssu, or the famous monastery of Labrang, our long-anticipated destination. The route for the first day followed mainly up the bed of a torrent. The second day we crossed an immense undulating grassland ranging in

⁹ The map (pl. 21) shows only approximately Ching's route from Kumbum to Cha Shih Pa. In answer to an inquiry concerning this route addressed to Mr. Ching, he replied: "The route from Hsi Ning to Cha Shih Pa is not indicated on any map, because it is a very small trail. One has to camp overnight".—E. H. W.

¹⁰ The route shown on the map (pl. 21) is that of a trade route shown in Ting's atlas. Concerning the route to Labrang Mr. Ching writes: "The route from Hsün Hua Hsien to Labrang is non-existent; I just took a cross-country run over undulating rolling country not inhabited by people for three successive days' journey".—E. H. W.



A, The Golden Stupa of Labrang.

B, Some of the temples of Labrang with surrounding hills.



- A*, The city of Old T'ao Ch'ao, with its surrounding barren hillsides terraced and cultivated almost to the summit.
- B*, The T'ao Ho looking downstream from the top of a ridge in the T'ao Valley showing the forested hills.

elevation from 9,500 to 11,500 feet. Woody plants were almost completely lacking. Not a single human being was seen during these two days, although deserted Tibetan houses of mud were observed. We camped at night. Because of missing the way on the second day we did not arrive at our destination until 9 a. m. on the third day.

Labrang, altitude 8,900 feet, is a trading center and a meeting ground for Tibetans, Mohammedans, and Chinese. Besides having over a hundred shops kept by Mohammedan and Chinese merchants from Shensi, it boasted a magnificent temple housing more than 3,000 Tibetan lamas. (See pl. 24.) The Labrang Ho runs placidly through the valley from the west, the water blue and clear, spanned by 5-arch bridges, being the loveliest sight I have seen in this part of the country. The clearness of the water suggested the existence of immense forests at its source, far up in the Tibetan country.

Another three days' journey of 240 li, with Lung Hua and Nei Wu as the intervening stopping-places, brought us to Old T'ao Chou, altitude 8,850 feet, thus finishing another of the major stages of the journey. Between Labrang and Lung Hua the way led steeply over a sharp ridge attaining an elevation of 11,610 feet, but otherwise the journey was rather easy, being chiefly through shallow valleys and over low, gentle, partly cultivated hills. Most of the farmers were Tibetans. A hardy variety of barley constituted the main crop, with peas and broad beans much less common and wheat particularly rare on account of its inability to reach maturity at this altitude of over 9,000 feet. The neighborhood of Lung Hua was very densely wooded, while the regions beyond as far as T'ao Chou were merely typical Tibetan grasslands.

This section, from Hsi Ning to Old T'ao Chou, took us altogether 20 days, of which only 8 were devoted to collecting, as the whole region with a few exceptions was very bare. It is doubtful whether more time spent en route would have been profitable.

Section 4: Old T'ao Chou to Cho Ni.—It is only 40 li between these points by the regular trade route, the only one so far as we know ever taken, but by the time we reached Cho Ni we had covered 450 li. The route of our exploration can be seen on the map (pl. 21).

The city of Old T'ao Chou is situated in a valley bottom 20 li north of the T'ao Ho. (See pl. 25, A.) This river winds through a mountainous country, pursuing a very long and dragonlike course by way of Cho Ni, Min Chou, and Ti Tao Hsien before it empties into the Yellow River. We had planned to make the vicinity of T'ao Chou our last collecting point, but grateful information from Mr. Fesmire, an American missionary there, concerning the geography and strategic collecting grounds, caused us to alter our original plan.

On August 28, after spending two days in drying our collections, we left the city by the south gate for an area called Jargannar in Tibetan

and Shih Men in Chinese, on the northern border of the land of the Tebbus,¹¹ a region noted for robbery. We took with us a new local guide who could speak Tibetan and who was very familiar with the country. It required three days to reach our destination, 180 li from T'ao Chou, although it could be accomplished in two days in spite of the roughness of the road. For the first 20 li the road led down a valley to the edge of the T'ao Ho, which we crossed on a boat. (See pl. 25, *B*.) Here was a large landing for spruce logs floated down the river from its upper reaches. They were piled by the thousands on the bank for seasoning before being transported by carts to the cities north of the river for sale.

Having followed a sinuous path by the river for about 7 li, we turned into Ch'ia Ch'ing Kou, a large valley extending almost due south and traversed by a stream flowing into the T'ao Ho. On both sides, especially in the short lateral valleys, nestled Tibetan hamlets at frequent intervals. We crossed and recrossed the stream four or five times before reaching our camping ground under a broken spruce forest beside the village of Ch'ia Ch'ing at an altitude of 9,800 feet. We had come 70 li during the day, over an easy road.

Shortly after we started the next morning, the road divided, one branch leading due south, the other southwest. We chose the latter, which at once crossed a bridge and then grew very confusing as it broke up into numerous lateral branches. The Tibetan hamlets became less frequent as we ascended the valley, because of the increasing altitude and the diminishing amount of arable land, till at last they disappeared entirely and for the last 20 li of our day's journey we found no human habitations, but only lofty rocky ridges of magnificent and savage grandeur on every side. We camped at the end of 60 li on a flat piece of grassland beside the stream we had been crossing and recrossing by bridges and logs many times during the day. Our altitude was over 10,800 feet and the temperature particularly low. We found the next morning the water frozen in our water-bag left outside the tent. In spite of the cold night we had all felt quite at home, since we had a large charcoal fire in the tent with fuel brought from T'ao Chou.

An early start was made the next morning, as the road for the day was said to be difficult. After proceeding 25 li up the valley followed the previous day, we began ascending a gravel-strewn narrow trail over a snow-clad and sharp rocky ridge of gray limestone almost entirely devoid of vegetation, at an altitude of 12,800 feet, part of the Kansu Min Shan. The bare, rugged, perpetually snow-clad ridge was

¹¹ For a vivid account of a journey into this region, in June 1925, probably by the same entrance through which Ching approached its border, see Joseph F. Rock, *The Land of the Tebbus*. *Geogr. Journ.* 81: 108-127. *illus.* 1933.—E. H. W.

a grand and conspicuous feature of the region, and was visible for a distance of 150 li.

From the summit we descended westward by a gentle path for 6 li and then, turning south, entered the upper mouth of a gorge at an altitude of 11,500 feet. This gorge, known in Tibetan as Malisoondo (transliterated into Chinese as Ma Li Sung Tu), is 16 li long and bounded on both sides by absolutely perpendicular gray limestone cliffs, which seemed so newly formed that no green plant had been able to gain a foothold. Ten li farther south we passed a defile called the "Stone Gate," only 13 feet wide, between two vertical cliffs with their upper parts almost joined together. (See pl. 26, A.) It would have been almost impossible for either man or beast to pass through without being swept away by an extremely violent mountain torrent forcing its way through, had it not been bridged by a series of logs.

Five li farther south the gorge widened all at once into a great cup-shaped depression, walled in on all sides by lofty, almost unscalable rocky and partly wooded slopes. A Tibetan hamlet of about 30 families, together with a small lamasery nestled halfway up the northern slope, commanded a view of the surrounding country. On the lower slopes, and wherever the nature of the land permitted, barley and broad beans were grown. To my mind, the whole region could hardly be surpassed in savage grandeur, even by the most splendid scenes of western Hupeh or Szechwan, and nowhere in all China could the gorge of Malisoondo together with its "Stone Gate" possibly find a parallel in magnificence. (See pl. 26, B.)

We stayed here at a Tibetan house, our host being an acquaintance of my new guide. We collected in the vicinity for a couple of days before traveling back by the same route as far as the T'ao Ho. Cho Ni was reached on September 3 by a march along the south bank of the river.

The city of Cho Ni, at an altitude of 8,700 feet, lies on the north side of the river. Here is the yamen of a prince by the name of Yun, a hereditary officer governing a population of 48 clans of Tibetans, largely inhabiting the country south of the river beyond the Min Shan range. The city boasts some hundred Tibetan families and about 30 shops kept by Chinese and Mohammedans.

Mr. Wulsin with his party unexpectedly joined me here the next day. After resting for a couple of days we started together for a country called A Chüan (in Tibetan called A-E-Nar),¹² 90 li south of the river on the northern side of the Min Shan. The road on the whole was an easy one to travel. For the first 18 li, as far as the Tibetan hamlet "Mo-U," it followed along the south bank of the river. Here is the home of the present Prince Yun, and the yamen where his

¹² Called Adjuan by J. F. Rock.

predecessors carried on their administrative work is still in good condition. On leaving the hamlet, we gradually ascended a low ridge, at an altitude of 9,500 feet, with a lamasery and a few farmhouses nestled away on the slope on our left. Descending the farther side, we found ourselves in a large open village drained by a stream of crystal-clear water, a tributary of the T'ao Ho only a few li to the north. For the remainder of the day we ascended this valley almost due south and thrice crossed the stream on well-built wooden bridges. This stream is an important route for the rafting of enormous numbers of spruce and fir logs cut on the Min Shan and shipped in small rafts to the T'ao Ho. There were many small hamlets by the roadside and intensive agriculture was much in evidence. We did not reach our destination till dark, but with the aid of Mr. Liu, Mr. Wulsin's taxidermist, who had arrived a few days previously, we were able to obtain a Tibetan house without trouble.

From A Chüan we could see only 40 li to the south the lofty snow-clad, rock ridges we had crossed a few days previously on our way to Jargannar (Shih Men). (See pl. 26.) This town was said to be at the end of the first stage from Cho Ni along a main trade route to Sung P'an in northwestern Szechwan, which might be reached in 9 or 10 days on horseback. We remained here for two days before turning back by the same route to Cho Ni.

One striking fact we observed here was that practically the whole country south of the T'ao Ho extending for hundreds of li in length and breadth was densely wooded, or at least grass-covered, whereas the north side was dry and exposed and as bare as it could be. (Compare pls. 25, A, and 27.) The relative density of population was exactly opposite to that of the vegetation, thus showing again the influence of civilization on the forests. We found this section of the trip from Old T'ao Chou to Cho Ni botanically very interesting, as will be described later.

Section 5: Cho Ni to Lanchow, distance 490 li.—The route we followed for this journey was the regular trade highway. We traveled steadily, except for a few stops at places of botanical interest. The road lay either through valleys or over transverse mountain ridges, partly in the Lien Hua Shan, and, though at times arduous, was on the whole easy. The whole region was highly cultivated, and agriculture seemed to become increasingly prosperous as we journeyed, because of the increasingly favorable climate, the more level land, and the greater fertility of the lower country. Inns were available every 30 or 40 li. On two occasions our daily stages were 110 and 120 li each, yet the following mornings we were as refreshed as ever before. We arrived at Lanchow at noon on September 26, the Chinese midautumn festival.

General observations.—Our experience indicated that Kansu is one of the most peaceful provinces in all China, there being no robbers and very few bandits, if any. We were told that some of the Moham-medans and Tibetans are notorious and habitual thieves and have often caused travelers to suffer when chance offered, but we think that accidents of this sort can be avoided by taking proper precautions or by obtaining competent escort from the local officials.

Western Kansu has an ideal climate, being cool and comparatively dry even in summer and autumn. The temperature in the hottest season of the year is somewhat equivalent to midspring and late autumn in eastern China, and thick blankets can never be done away with at night. The rainy season begins about the middle of June and continues far into September. During this period it rains almost every day, but it is only a fine drizzle, generally of short duration. The atmosphere and the ground in the wooded and grass-clad country in the southwestern part of the province are very moist, the latter often assuming a swampy appearance.

Meat from sheep, pigs, cattle, and chickens is particularly cheap and is available almost everywhere. Rice is scarce and obtainable only in the *hsien* cities, wheat flour being available in the small towns and market villages. Marine and aquatic products are exceedingly expensive, as are also articles of foreign origin. In general, the cost of living is almost as high as in eastern China, but several times more expensive for travelers from the coast, owing to the scarcity and high cost of the products to which they are accustomed.

THE VEGETATION OF KANSU

At the present time the vegetation of Kansu is on the wane, as is true elsewhere in China. Throughout the length and breadth of the whole province no vegetation of any sort is still virgin or still in the virgin state. Areas of dense vegetation, as in other parts of China, are relegated to localities that are either inaccessible or uninhabitable, for wherever the Chinese go agriculture follows and the natural vegetation begins to disappear. Possibly the more primitive peoples have a better appreciation of and instinctive love for the natural beauty of their environment, which depends so largely on an extensive and varied plant cover. More likely, however, their nomadic life and sparser population call for less agricultural land than do the agricultural life and denser population of the Chinese. The forests still remaining in this province are fast being destroyed by the reckless Chinese wood merchants.

The northeastern part of the province, as far as we could observe on our journey, is absolutely bare except for a very small part of Ho Lan Shan, which is wooded chiefly with second-growth spruce. The

region is either an immense desert of shifting sands from Mongolia or else is devoted to intensive cultivation, dry farming being in a highly developed state and a noteworthy feature along the road from Ningsia to Lanchow. About the villages and hamlets are grown poplars (*Populus simonii*), elms (*Ulmus pumila*), and willows (*Salix* sp., probably *S. matsudana*), but nothing else, and these are rarely found wild. In the vicinity of Ningsia *Elaeagnus angustifolia* is found fairly commonly both about farms and in the wild state, often reaching 15 meters in height and a meter in girth. Two or three horticultural varieties of *Zizyphus* are abundant, several large plantations of jujubes being met with along the way. They seemed to thrive on moist sandy soil. This paucity of vegetation in northern Kansu is probably due to the loess soil and the scant precipitation. Only strongly xerophytic plants can survive.

Of the flora of the southeastern part of the province we have no knowledge; but it is probably little if any better, judging from reports of the denseness of the population, although the climate is more favorable.

The only part of Kansu at all botanically rich is unquestionably the western portion, of which the regions south of T'ao Chou and west of Lien Ch'eng may be considered typical. The vegetation there is by no means rich in variety, as compared with parts of western Hupeh and Szechwan, but it is interesting because of its distribution and its cold-temperate and subalpine components. I have never before in China seen the vegetational formations so clearly defined. There were generally three distinct types, namely, forest formations, scrub formations, and grassland, steppe, or prairie formations. The first are either pure or mixed forests, the pure forests being either spruce or pine, or, to a lesser extent, birch. The mixed forests are composed of spruce, birch, willow, and poplar, with spruce predominating. In the cut-over mixed forests, however, where the spruces of merchantable size are mostly cut, poplar (*Populus tremula* var. *daurica*) takes the place of the spruce with incredible rapidity. In the pure stands, notably those of fir, the very density of the growth precludes the entrance of other arborescent species, and even of much undergrowth. *Rhododendron rufum*, a large-leaved, evergreen species, growing up to 5 meters in height, seems to be the only constant companion of the fir, while under spruce forests *Caragana jubata*, a very thorny slender species with white flowers, is always to be expected. The forest formations, though limited in area, furnish the people with wood for hundreds of uses. No pure fir forests are to be found below 11,500 feet elevation. Forests of spruce and other species occur below this as far as the 7,000 foot elevation. *Larix potanini* is found scattered here and there only above the fir on inaccessible cliffs and quite exposed rocky ridges.

The scrub formations, the least in extent of the three, are composed of three or four species of small-leaved rhododendrons forming immense low impenetrable thickets reaching from the foothills up to the summits of the gentle moist slopes. No other species, with the possible exception of a shrubby willow, ever occur in the scrub. They are of no economic importance.

The prairie or grassland, known locally as "tsao-ti," is typical of the Tibetan Plateau and is greater in extent than both of the other formations combined. Vast rolling stretches of verdure with the complete absence of woody plants are characteristic features of this formation. It constitutes an ideal pasturage for herds, and consequently grazing is the main occupation of the Tibetans.

These three types of vegetation, although often interrupted by hard, dry, gray hills of clay, or clearings made by man, frequently border one another in a distinctly regular way, the scrub emerging, as it were, from the forest, and the grassland from the scrub.

As mentioned above, the flora of western Kansu is essentially of cold-temperate and subalpine composition, though high alpine forms are by no means uncommon, more especially on the steppes and above the tree line. The temperate or warm-temperate forms, as those that predominate in the mountains of the Yangtze basin, are almost totally absent. The following description of the distribution of the vegetation according to the altitude may be of help in understanding this:

Cold-temperate belt.—Altitude 6,000 to 10,000 feet. This is the most important belt, since the bulk of the economic timber species grow here, besides flowering shrubs in great luxuriance. The commonest and possibly the only arborescent constituents of this zone are species of *Picea*, *Betula*, *Populus*, *Ulmus*, and *Pinus*.

Of the showy and ornamental shrubs common throughout this zone there are species of *Juniperus*, *Salix*, *Corylus*, *Ostryopsis*, *Berberis*, *Hydrangea*, *Philadelphus*, *Ribes*, *Cotoneaster*, *Crataegus*, *Malus*, *Potentilla*, *Prunus*, *Rosa*, *Rubus*, *Sorbaria*, *Sorbus*, *Caragana*, *Evonymus*, *Acer*, *Cornus*, *Syringa*, *Lonicera*, and *Viburnum*. In summer the valleys and lower slopes are almost completely clad in a mass of color.

Subalpine belt.—Altitude 9,500 to 12,500 feet. In this zone the woody species are fewer. *Abies* is the dominant element, with two species of *Picea* next in abundance and *Larix* still less common and confined to the extreme upper part of the belt. *Betula* is not uncommon. In valleys, along streams, and on slopes other than those occupied by pure spruce and fir forests, species of the following genera are found forming a luxuriant scrub growth: *Juniperus*, *Salix*, *Potentilla*, *Rosa*, *Sibiraea*, *Sorbus*, *Caragana*, *Daphne*, *Elaeagnus*, *Rhododendron*, *Abelia*, and *Lonicera*. Among the common herbs are various species of coarse grasses, *Polygonum*, *Aconitum*, *Delphinium*, *Corydalis*, *Parnassia*, *Potentilla*, *Astragalus*, *Gentiana*, and *Pedicularis*.

Alpine belt.—Altitude 12,500 to 14,000 feet. Practically no woody plants of tree form are to be found here, though procumbent shrubs occur sparingly. The wealth of low herbs is really astonishing. They clothe the vast rolling country late in summer and in autumn with a carpet of intense color. Chief among them on the steppes are many species of lemon-yellow, purplish-blue, and deep red *Meconopsis*, blue *Gentiana*, lemon-yellow, purplish red *Pedicularis*, and lemon-yellow and purplish *Aster*. Minor herbs are species of grasses, sedges, *Paraquilegia*, *Parnassia*, *Anaphalis*, *Crepis*, and *Saussurea*. A striking feature of these alpine regions is the suddenness with which they burst into bloom, usually in June. From then till late in August the country is a riot of intense and varying color, fairly dazzling the traveler's eyes, simulating an earthly paradise. When this brief season is over, scarcely a plant remains in bloom. Another striking feature is the relative paucity of species as compared with a similar habitat in other regions. Roughly speaking, the highland flora in this province contains only about as many species as are to be found in like situations in temperate regions. This is in accordance with the well-recognized fact of the intensely gregarious, hence exclusive nature of the alpine floral components, whether grass, herbs, scrub, or forest. I remember on one mountain in Hupeh¹³ we collected in a single day 125 different species, both woody and herbaceous, mixed in great confusion; but with only one or two exceptions, I never collected more than 50 species in two or three days of consecutive collecting in a single locality on the present expedition.

A final fact not to be overlooked by a student of these alpine floras is the great preponderance of herbs over trees or shrubs, because the short growing season and the low mean annual temperature combine to make the existence of woody perennials precarious. The change in vegetation with increase in altitude was particularly striking at Lien Ch'eng, where between 7,000 and 8,000 feet altitude herbs are subordinate to woody plants, both in number and extent, but at higher elevations herbaceous and woody plants give way almost completely to low herbs so characteristic throughout all alpine regions.

PRINCIPAL BOTANICAL AREAS

Throughout the whole region we traversed there were only four areas of much botanical interest. The first was Ho Lan Shan, on the north-eastern border of Kansu; the second was around Lien Ch'eng, in the northern or north-central part; the third was the southern area south of Old T'ao Chou; and the fourth was Lien Hua Shan, between the

¹³ In the summer of 1922 Prof. W. Y. Chun, S. Chien, Mr. Whang, and the writer conducted a botanical expedition in western Hupeh.



A, The Shih Men, or Rock Gate, into Tebbu Land, worn by the "Kaichou" or "Wutu" through a limestone barrier at 9,700 feet altitude.

B, The Great Shih Men, or Great Rock Gate, leading into Tebbu Land in the Min Shan Range at 11,500 feet altitude.



The densely forested Ta Kien, or Big Gorge, southwest of the Tibetan village A Chuan.

southern area and the capital at Lanchow, about in the center of the province. The following is a brief floristic description of each area:

Ho Lan Shan.—This was the first region visited. It extends for several hundred li from the northeast to the southwest parallel to the Yellow River, which it cuts off from the Gobi Desert in Inner Mongolia. It is wooded chiefly in its central parts, where altitudes of 12,500 feet are attained. Southeast of this range lies the Ningsia Plain, 100 li long, and 60 li wide, between the mountains and the river. It is flat and exceedingly fertile; hence it is the richest agricultural part of the province. On a foothill on the northwestern border of the Ho Lan Shan range lies Wang Yeh Fu, where our first major collection was made.

My donkey driver informed me that the northern side of the range is regularly dissected by almost parallel, narrow valleys and gorges intercommunicable at one end or the other. Similar gorges dissect the southern side, but the two series are not connected except in one place that forms a natural pass, through which we went on our way to Ningsia. A network of woodcutters' trails and donkey paths covers the rough and precipitous interior of the range. The outer portions are bare except for low drought-stunted junipers (*Juniperus rigida*). The interior, however, bore pure, dense forests of spruce (*Picea asperata*) on the lower slopes. *Populus tremula* var. *daurica* along with spruce was common on cut-over areas. Pure forests of pine (*Pinus tabulaeformis*) were restricted to one or two valleys. Since this pine is heavier, hence more costly to transport, it is seldom molested by the woodcutters. Trees with trunks two feet in diameter were therefore abundant. The spruce, on the other hand, had been cut rather recklessly, and none as much as a foot in diameter were seen. It is not improbable that this forest will disappear completely in the near future, unless the local officials act to limit the annual destruction and encourage natural reproduction.¹⁴

Willows (*Salix*) of many species, both shrubby and arborescent forms, are a feature of the wet valleys and lower slopes. Most noteworthy was a dense shrub, *Syringa oblata* var. *giraldii*, clothed with a mass of purple and filling the air with fragrance. This was equally true of a yellow-flowered rose (*Rosa xanthina*), a low dense bush on exposed, dry, rocky slopes, and of several species of *Caragana*. A small-leaved, medium-sized elm (*Ulmus glaucescens*) was common along the roadsides in Pei Ssu Kou. Other common shrubs were *Ostryopsis*, *Berberis*, *Cotoneaster*, *Malus*, *Potentilla*, *Spiraea*, *Syringa oblata* var.

¹⁴ Readers interested in this subject will find the following paper instructive: Lowdermilk, W. C., and D. R. Wickes, History of soil use in the Wu T'ai Shan area. Pp. 1-31. fig. 1-22. maps 1-3. 1938 (a monograph issued under the auspices of the North China Branch of the Royal Asiatic Society).—E. H. W.

alba, and *Lonicera*. A single stately specimen of *Xanthoceros sorbifolia* was seen, its profusion of white paniced flowers making it unsurpassed in beauty by any other species.

Among the most common and striking herbs were various species of *Primula*, three species of *Androsace* and *Anemone*, and two species of *Clematis* with large white and purple flowers, respectively. *Pyrola rotundifolia* subsp. *chinensis* with a species of *Caragana* formed an undergrowth in spruce forests at an altitude of about 10,000 feet.¹⁵ *Juglans regia* and *Morus alba* were grown on the farms among the foothills on the south side of the range. The former seemed to thrive well and to attain a diameter of 2 to 3 feet. This locality is probably the northwestern limit of this species, as none were seen beyond.

Lien Ch'eng.—This region was visited early in June. It was found to have a far richer flora than the Ho Lan Shan region, with the forest type predominating. The woodland region began not more than 3 li from the city walls and extended along the Ta T'ung Ho for over 250 li. Scrub formations occurred at altitudes above the forests, and there were grasslands on the highest mountains.

As in the Ho Lan Shan range, spruce (*Picea asperata*) was the dominant forest species between 6,500 and 10,200 feet altitude. Two other species of spruce occurred at lower altitudes and were reported to be better timber trees, furnishing a superior grade of wood. Trees, with trunks 7 to 9 feet in diameter were abundant everywhere, but especially in the mountains. Ten years from now conditions will be greatly changed, since the trees are being cut by Chinese merchants in a very destructive way. This forest wealth, as almost everywhere in the province, is owned by the Tibetan lamaseries, from whom the lumbering rights are purchased by Chinese merchants at a very low annual rent. Poplars (*Populus tremula* var. *davidiana*) and birches of three kinds are the next most dominant species. One (*Betula japonica*), with white or grayish bark, is known locally as "white birch." Another (*Betula albo-sinensis* var. *septrionalis*) is called "red birch," on account of its shining brown, papery bark, marked by long horizontal lenticels, which peels off in large thin sheets. This is used locally for wrapping butter and other articles of food. The third kind, the "purplish birch" (*Betula albo-sinensis*), has a dark-brown, tight-fitting bark with white, roundish lenticels. They are found either in association with spruce or in pure stands of restricted extent. *Corylus sieboldiana* var. *mandschurica* and two species of *Acer* (*A. davidi* and *A. tetramerum* var. *betulifolium*) are common shrubs in ravines and in woods. A thorny bush, *Hippophae rhamnoides* var. *procera*, frequently forms impenetrable thickets in wet

¹⁵ This is apparently *Caragana jubata*, but it may be *C. tangutica*, both of which Ching mentions on field labels as occurring in *Picea* forests (see p. 636).—E. H. W.

swampy valleys and even on flat mountain summits. The outstanding feature, however, is the gorgeous display of white blossoms of *Philadelphus pekinensis* var. *kansuensis*, *Hydrangea bretschneideri*, *Sorbus* (2 species), and *Sorbaria arborea*, found everywhere. Other woody species found here, but not in the Ho Lan Shan area, are *Prunus* (3 or 4 species), *Ribes* (2 or 3 species), *Rosa* (3 species), *Lonicera* (5 or 6 species), *Juniperus* (2 species), *Daphne giraldii*, *Sibiraea laevigata* var. *angustata*, *Salix* (several species), and *Populus* (2 species). The scrub from 9,500 to 10,500 feet altitude is composed of small-leaved rhododendrons (*Rhododendron capitatum* and *R. thymifolium*). Two other rhododendrons with large obovate evergreen leaves (*R. agglutinatum* and *R. anthopogonoides*) are frequently found in woods with wet mossy floors and on ridges at higher elevations.

Lien Ch'eng is the chief lumbering section of Kansu, shipping to Lanchow fully one-half of the annual crop of timber cut in the western part of the province. The logs are floated down the Ta T'ung Ho late in spring and early in autumn, when the current is not so swift as in summer.

During the four weeks spent in this vicinity over 400 specimens of woody and herbaceous species were collected. Further gleaning would no doubt increase this number. So far as known, Reginald Farrer is the only other botanist who has collected here extensively.^{15a} The lack of proper food and the rugged country made work difficult. Further explorations would have been undertaken, but for the failure of the food supply.

Old T'ao Chou.—This was the third important region in which we collected. Frequent reports had filled us with high hopes for successful botanical and zoological work in this collecting ground. In this we were partly disappointed, for with the exception of a few restricted wooded areas in the extreme north near Labrang the whole region north of the T'ao Ho was absolutely bare of woody species, only the typical Tibetan grasslands abounding.¹⁶ Hence, we were chiefly concerned with the region between the T'ao Ho and the Min Shan range, an area inhabited entirely by Tibetans. It is all mountainous and has altitudes ranging from 8,300 feet at the river to 13,500 feet on the perpetually snow-clad rocky ridges.

An enumeration of the flora of this region would be largely a repetition of that of the other areas discussed. Among the interesting

^{15a} Many species described by Maximowicz from Przhevalski's collections are designated as from the Ta T'ung Ho Valley, and may have come from at least the vicinity of Lien Ch'eng.

¹⁶ Mr. Ching seems to have placed undue emphasis on the importance of collecting only in wooded areas. It is doubtless true that there is a greater number of species to be found in such regions, but the intervening areas contain plants not found elsewhere, especially species of the all-important grasses.—E. H. W.

new arborescent forms collected were the silver fir (*Abies sutchuenensis*), the larch (*Larix potanini*), and two or three species of spruce. *Picea purpurea* and two other closely allied species were more abundant than *Picea asperata*, and proved to be hardier, growing at higher elevations, between 8,500 and 10,000 feet. At their upper limits they gradually give way to the silver fir, which extends up to 10,700 feet throughout an extensive area and in pure stands. In these fir forests the large-leaved evergreen *Rhododendron rufum* thrived as the sole woody undershrub. *Larix potanini* terminated the tree line at 11,000 feet, growing on sheer rocky ridges and on inaccessible cliffs. On the lower slopes it was often sparsely mixed with birch and silver fir, but always its crown of pendulous branches towered above in the better light. Four junipers (*Juniperus pseudosabina*, *J. saltuaria*, *J. squamata*, and *J. squamata* var. *fargesii*), not collected previously on this trip, were found in abundance. *J. squamata* is a shrub, but the others are trees. *J. pseudosabina*, with drooping branches and large black fruits, attains a diameter of 1 meter and a height of 15 meters and often forms small groves on flat moist foothills at 9,500 feet altitude. Around Cho Ni in the valley of the T'ao Ho the much-branched shrub *Malus transitoria*, with small, lobed leaves and an abundance of acid, buttonlike, red fruits, was conspicuous. *Tamarix chinensis*, *Sibiraea laevigata* var. *angustata*, and several bushy willows were common shrubs along the mountain streams. Other shrubs not seen before were *Abelia zanderi*, *Rubus* (3 species), *Berberis* (2 species), *Prunus* (2 species), *Cotoneaster* (2 species) and *Lonicera* (several species).

That the wealth of the flora of Kansu is concentrated in the watershed of the upper T'ao Ho is unmistakably shown by the extreme clearness and the placid flow of this river. Nowhere else did we see a single river or stream of such clear water as here, except possibly the Labrang Ho (see p. 581). The presence of enormous quantities of logs up to a meter in diameter floating by endlessly year after year affords further evidence of the existence of a vast primeval forest on this watershed.

Lien Hua Shan.—This was the last though not the least important place where we collected on this trip. It is a massive mountain of hard limestone 11,500 feet in altitude, situated midway between Cho Ni and Ti Tao Hsien. It is only 120 li from Cho Ni to the village of "Kan Ku You" at an elevation of 9,300 feet on the southern foothills of the Lien Hua Shan area, and an equal distance from Ti Tao Hsien to another and smaller village called "Suan Sun Miar," at an altitude of 7,300 feet on its northern slope. To my everlasting regret we were unable to pay more attention to the flora here, since the party remained only one and a half days for a general survey before hurrying back to Lanchow. However, judging from our collections and obser-

vations, it is safe to say that this mountain can boast the richest flora of all the localities visited on this trip. Besides many endemics, the flora embraces practically all the species found in the previously mentioned localities. Furthermore, it contains a greater proportion of woody plants. The species collected here that were not found elsewhere were *Pinus armandi*, *Tilia chinensis*, *Viburnum lobophyllum*, *V. opulus*, *Acer* (3 species), *Elaeagnus umbellata*, *Rosa davidii*, *Cotoneaster acutifolia* var. *villosula*, *Viscum album*, and a number of herbaceous plants. The general appearance of this mountain reminded me of some of the richest mountains in western Hupeh, and it is my hope to return some day and explore it thoroughly.

SYSTEMATIC ENUMERATION OF SPECIES

PINACEAE

Abies sutchuenensis Rehd. & Wils. in Sarg. Pl. Wils. 2: 48. 1914.

First described from Szechwan.

Lung Hua, Nos. 803, 806; Tu I Kou, No. 984. In pure stands or associated with *Picea*. Common at altitudes above 3,300 meters.

A tree, up to 28 meters high; cones deep purple, resinous, upright, not easily detached. The timber is harder than that of *Picea* and inferior in quality. It is used for general construction and low-grade furniture.

Larix potanini Batalin, Act. Hort. Petrop. 13: 385. 1894.

First described from Potanin's Tibet collections.

Tu I Kou, No. 985. On summits of rocky ridges by the "Stone Gate" (Shih Men), forming pure stands or scattered among *Picea* and *Betula*. Common.

A tree, up to 30 meters high, the branches shining, yellowish brown, smooth; cones persistent, the scales brown-margined. The wood is of fine quality and is used for good furniture and other articles.

Picea asperata Mast. Journ. Linn. Soc. Bot. 37: 419. 1906.

First described from "western China."

Wang Yeh Fu, No. 34; T'u Er P'ing, No. 453. In forests. Common. Cho Ni, No. 995. In hard clay along an exposed roadside.

A tree, up to 25 meters high, appearing glaucous from a distance, contrasting with those of *P. wilsonii*; flowers fully open, the pistillate cones very resinous, deep purple, with persistent bud scales, the mature cones deciduous. The wood is softer than that of *P. wilsonii* and is brittle. It is used for general construction.

Picea purpurea Mast. Journ. Linn. Soc. Bot. 37: 418. 1906.

First described from "western China."

Between Labrang and Lung Hua, Nos. 804, 805; Tu I Kou, No. 992. In *Picea* forests, reaching higher elevations on mountains than any other spruce. Common.

A tree, up to 25 meters high with a slender trunk, the foliage dense, dark green; cone scales purple-margined. The timber is of fine quality and is used for general construction.

Picea wilsonii Mast. Gard. Chron. III. 33: 133. fig. 55, 56. 1903.

First described from Hupeh.

T'u Er P'ing, No. 452; Tai Wang Kou, No. 454. In *Picea* forests up to 3,000 meters altitude, not occurring with *P. asperata*. Common.

A tree, up to 21 meters high, appearing yellowish green from a distance; cones persistent, smaller than those of the two other species occurring here. The wood

is harder than that of *P. asperata* and is the most valuable of the three, being used for general construction.

Pinus armandi Franch. Nouv. Arch. Mus. Hist. Nat. (Paris) II. 7: 95. *pl. 12*. 1884. (Pl. David. 1: 285. *pl. 12*. 1884).

First described from central Shensi.

Between Hsin Ch'eng and Ha Ho, No. 1043. In forests on northern slopes, generally on the edges of rocks and cliffs. Common.

A tree, up to 25 meters high, the trunk straight, 45 cm. in diameter. The seeds are edible. The timber is of fine quality.

Pinus tabulaeformis Carr. Trait. Conif. ed. 2, 510. 1867.

First described from trees grown in France from Chinese seeds.

Ch'ien K'ou, No. 2; Wang Yeh Fu, No. 33; Shui Mo Kou, Ho Lan Shan, No. 104; Cho Ni, No. 998. Small, scattered, and associated with broad-leaved trees in the first localities, larger and in pure stands in Shui Mo Kou above 2,600 meters altitude, and in pure forests of large trees along the T'ao Ho in southern Kansu.

A tree, up to 30 meters high; cones persistent for 20 years or more. The wood is more valuable than that of *Picea* and is used for furniture. In Mongolia the stumps and roots are distilled for pyroligneous acid, used in curing wounds on camels.

CUPRESSACEAE

Juniperus chinensis L. Mant. Pl. 1: 127. 1767.

First described from China.

Ha La Hu Kou, Nos. 52, 53. A dwarf shrub, 30 to 60 cm. high, forming large patches, often in rocky crevices on exposed cliffs. Pei Ssu Kou, No. 110. A single tree, 10 meters high, growing by the lama temple, Pei Ssu. Lien Ch'eng, No. 320. Many cultivated trees, 10 meters high.

Berries glaucous, blue. The wood is used for high-grade furniture.

Juniperus pseudosabina Fisch. & Mey. Ind. Sem. Hort. Bot. Petrop. 8: 65. 1842.

First described from the Altai Mountains.

T'ai Hua, No. 558; Shih Men, No. 892; A Chüan, No. 990. Forming pure forests or growing isolated on dry slopes. Common.

A tree, up to 9 meters high, the branches drooping; berries black, slightly glaucous, over 1 cm. in diameter. The wood is of good quality and is used for furniture and burned as incense by Tibetans.

Juniperus rigida Sieb. & Zucc. Fl. Japon. 2: 56. *pl. 125*. 1870.

First described from Japan.

Ch'ien K'ou, No. 4; Wang Yeh Fu, Nos. 39, 43; Shui Mo Kou, Ho Lan Shan, Nos. 93, 101. Growing with *Pinus* and *Thuja* or along roadsides with *Picea*, *Populus*, and *Salix*. Common, but especially abundant in Shui Mo Kou. Cultivated at Wang Yeh Fu.

A tree, up to 7 meters high, the branches drooping; flowers dioecious, the berries glaucous. The wood is used for fuel and for making valuable furniture.

Juniperus saltuaria Rehd. & Wils. in Sarg. Pl. Wils. 2: 61. 1914.

First described from Purdom's Kansu and Wilson's Szechwan collections.

Upper Ch'ia Ch'ing Kou, No. 881. On exposed moist slopes. Common.

A tree, up to 7 meters high, the branches erect, the foliage dark green. The timber is used for building material.

Juniperus squamata Lambert, Descr. Pinus 2: 17. 1824.

First described from the Himalayan region.

Upper Chi'a Ch'ing Kou, No. 862. On the lower slopes of rocky ridges, forming a dense, impenetrable scrub. Common.

A shrub, 1 meter high, the stems very tough, long, slender; foliage dense, dark green. The arrangement of the stems gives this a very ornamental appearance.

Juniperus squamata var. *fargesii* Rehd. & Wils. in Sarg. Pl. Wils. 2: 59. 1914.

First described from Szechwan.

Shih Men, No. 908. On exposed slopes. Common.

A conical tree, up to 6 meters high, the needles of one kind only.

Thuja orientalis L. Sp. Pl. 1002. 1753.

First described from Siberia. Chi'en K'ou, No. 3. Associated with *Pinus*, *Juniperus*, and *Cotoneaster*. Very common.

A tree, up to 3 meters high, generally sprouting from old stumps. The wood is used as fuel and for furniture, buckets, tubs, etc.

GNETACEAE

Ephedra equisetina Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 7: 500. 1851.

First described from the Ural-Caspian region.

Ha Ta Men River, No. 6; Pei Ssu Kou, No. 109. In isolated clusters on exposed rocky cliffs, often associated with *Lycopodium*. Rare.

A dwarf shrub, 30 to 60 cm. high, the stem woody, brown, persistent. Used medicinally.

Ephedra intermedia Schrenk & Mey. var. *glauca* (Regel) Stapf, Denkschr. Akad. Wiss. Math. Naturw. Wien 56²: 62. 1888 (?).

First described from central Asia.

Wang Yeh Fu, No. 29. In pure stands in large patches on dry, exposed sand.

An evergreen shrub, up to 50 cm. high; cone scales yellowish with a green circular spot in the center.

Ephedra monosperma J. G. Gmel. Mém. Acad. Sci. St. Pétersb. Sci. Nat. 5, Bot.: 279. 1846.

First described from Siberia.

La Chi Tzu Shan, No. 709. In dense tufts on partially shaded, rocky cliffs. Common.

A low shrub, 18 cm. high; cones reddish yellow. Used medicinally.

TYPHACEAE

Typha minima Hoffm. Deutschl. Fl. ed. 2, 2: 251. 1804.

First described from Europe.

Chung Wei, No. 229. On margins of streams.

Height about 60 cm.

JUNCAGINACEAE

Triglochin maritimum L. Sp. Pl. 339. 1753.

First described from Europe.

La Chi Tzu Shan, No. 695. Forming thick carpets on alpine summits or on moist, exposed steppes. Common.

Height up to 20 cm.; flowers yellowish green.

Triglochin palustre L. Sp. Pl. 338. 1753.

First described from Europe.

Shih Men, No. 911. Forming pure stands of large extent on exposed stream banks, where sometimes submerged. Common.

Height 45 cm.; fruit brown.

GRAMINEAE¹⁷

Agrostis hugoniana Rendle, Journ. Linn. Soc. Bot. **36**: 389. 1904.

First described from Shensi.

Ta P'an Shan, No. 672, in part. Forming a thick carpet on exposed, moist slopes. Common. Upper Ch'ia Ch'ing Kou, No. 857. Associated with *Trisetum spicatum* on steppes. Common.

Height about 45 cm.

Arundinaria sp.

A Ch'uan, No. 974 (sterile). In an open forest at 4,400 meters altitude. Common in the southwestern part of the province.

Height up to 3 meters, the stems and branches purplish.

Arundinella anomala Steud. Syn. Pl. Glum. **1**: 116. 1854.

First described from Japan.

Tu I Kou, No. 968. In a pure stand on an exposed, moist beach. Common.

Avena altior Hitchc. Proc. Biol. Soc. Washington **43**: 96. 1930.

La Chi Tzu Shan, No. 716 (type). Scattered on an exposed moist slope. Common.

Height up to 1 meter.

Avena suffusca Hitchc. Proc. Biol. Soc. Washington **43**: 95. 1930.

T'ai Hua, No. 527 (type); La Ch'ung Kou, No. 627; La Chi Tzu Shan, No. 687. In tufts or tussocks in exposed, moist places in ravines or on grassy slopes or steppes.

Height about 75 cm.

Beckmannia erucaeformis (L.) Host, Icon. Gram. Austr. **3**: 5. *pl. 6*. 1805.

First described from Siberia.

Yeh Ts'ang Kou, No. 822. In pure, dense stands on steppes.

Height 45 cm. Common.

Brachypodium sylvaticum (Huds.) Beauv. Ess. Agrost. 101, 155. 1812.

First described from England.

Hsin Ch'eng, No. 303; La Ch'ung Kou, No. 626. In tufts on exposed, bare or grassy slopes or cliffs. Common.

Height 75 cm.

Bromus tectorum L. Sp. Pl. 77. 1753.

First described from Europe.

Pa Yen Jung Kê, No. 741. On exposed, moist steppes. Common.

Height up to 50 cm.

Bromus sp.

Ni Ma Lang Kou, No. 763. On exposed, moist slopes. Common.

Height up to 1 meter.

Calamagrostis epigeios (L.) Roth. Tent. Fl. Germ. **1**: 34. 1788.

First described from Europe.

Chen Fan Ch'üan Tzu, No. 13. Forming shallow-rooted patches on sandy soil along the margins of intermittent mountain streams. Not common.

Height about 1 meter. Used as fodder for domestic animals.

Calamagrostis scabrescens Griseb. Nachr. Ges. Wiss. Göttingen **1868**: 79. 1868.

First described from the Himalayas.

Shih Men, No. 926. In large, dense tussocks on steppes.

Height 1 meter; panicle deep purple. Common.

¹⁷ Dr. Y. L. Keng has designated a number of these grasses as new, but, since his species are not yet published, the names are not used here.

Chloris virgata Swartz, Fl. Ind. Occ. 1: 203. 1797.

First described from the West Indies.

Yao Chieh, No. 258. On a dry, bare, gravelly roadside.

Height 45 cm.

Deschampsia caespitosa (L.) Beauv. Ess. Agrost. 91, 149, 160. *pl.* 18. *fig.* 3. 1812.

First described from Europe.

Shih Men, No. 910. In swampy places. Common.

Height up to 1 meter.

Deyeuxia spp.

1. T'ai Hua, No. 521a.

2. Lung Hua, No. 800. Forming a dense carpet in open forests.

Height up to 1 meter.

Elymus dahuricus Turcz. Bull. Soc. Nat. Moscou 11: 105. 1838 (*nomen nudum*); 29: 62. 1856 (Fl. Baical. 2: 348. 1856).

First described from Dahuria.

Ni Ma Lang Kou, No. 765. On exposed, moist slopes. Common.

Height up to 1 meter.

Elymus dasystachys Trin. in Ledeb. Fl. Alt. 1: 120. 1829.

First described from the Altai Mountains.

Yao Chieh, No. 253. On dry, bare, gravelly foothills. Common.

Height up to 45 cm.; inflorescence purple.

Elymus sibiricus L. Sp. Pl. 83. 1753.

First described from Siberia.

T'ai Hua, No. 521. On moist, partially shaded slopes. Common.

Height up to 60 cm.

Elymus sp.

Ni Ma Lang Kou, No. 748. Forming pure stands covering extensive areas. Common.

Height up to 40 cm. Used as forage.

Hordeum nodosum L. Sp. Pl. ed. 2, 126. 1762.

First described from Europe.

Yao Chieh, No. 298. On grasslands.

Height 25 cm.

Melica scabrosa Trin. Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 146. 1833.

First described from Bunge's collections near Peking.

Mouth of Hsi Yeh Kou, No. 184a. Associated with *Poa sphondylodes*.

Oryzopsis munroi Stapf, in Hook. f. Fl. Brit. Ind. 7: 234. 1896.

First described from western Himalaya.

La Chi Tzu Shan, No. 717. In tussocks on partially shaded slopes. Common.

Height up to 1 meter.

Pennisetum flaccidum Griseb. Nachr. Ges. Wiss. Göttingen 1868: 86. 1868.

First described from Kashmir.

Ni Ma Lang Kou, No. 749; Yeh T'sang Kou, No. 823. In extensive stands on very moist steppes. Common.

Height 60 to 90 cm. This is an important forage for the domestic animals of the Tibetans.

Phalaris arundinacea L. Sp. Pl. 55. 1753.

First described from Europe.

A Chüan, No. 983. Forming pure stands in rich soil along exposed, moist roadsides. Common.

Height 1 meter.

Phleum alpinum L. Sp. Pl. 59. 1753.

First described from the Alps.

Upper Ch'ia Ch'ing Kou, No. 855. In extensive, pure stands on steppes. Common.

Height up to 45 cm.

Phragmites communis Trin. Fund. Agrost. 134. 1820.

First described from Europe.

Chen Fan Ch'üan Tzu, No. 11, 12. Forming pure stands on alkaline, marshy soils, especially along lake shores. Labrang, No. 776. In wheatfields. Common.

Height up to 1.5 meters. Used for fuel and for fodder for domestic animals.

Poa acroleuca Steud. Syn. Pl. Glum. 1: 256. 1854.

First described from Japan.

La Ch'iung Kou, No. 638. In clusters on exposed, moist, gravelly beaches. Occasional.

Height 45 cm.

Poa arctica R. Br. Chlor. Melv. 30. 1823.

First described from Arctic America.

Shui Mo Kou, Ho Lan Shan, No. 98; T'ai Hua, No. 509. In a large patch forming a thick carpet on rich soil beside a stream.

Height 25 cm.

Poa attenuata Trin. var. *vivipara* Rendle, Journ. Linn. Soc. Bot. 36: 423. 1904.

First described from Shensi.

La Chi Tzu Shan, Nos. 691, 693. In tufts, forming a dense stand on exposed, moist steppes. Common.

Height 35 cm.; panicle reddish purple.

Poa nemoralis L. Sp. Pl. 69. 1753.

First described from Europe.

T'ai Hua, No. 543. In dense clumps in shady places. Common.

Height 35 cm.

Poa sphondylodes Trin. Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 145. 1833.

First described from Hupeh.

Mouth of Hsi Yeh Kou, Nos. 182, 184; Hsin Ch'eng, No. 302. On moist or dry, clay soil. Common.

Height up to 1 meter.

Setaria viridis (L.) Beauv. Ess. Agrost. 51, 178. 1812.

First described from Europe.

Yao Chieh, No. 257. Along bare, dry, gravelly roadsides.

Height 30 to 60 cm.

Stipa breviflora Griseb. Nachr. Ges. Wiss. Göttingen 1868: 82. 1868.

First described from the Himalayas.

Pei Ssu Kou, No. 111. Along the foot of a wall, in clay soil. Common.

Height up to 60 cm.

Stipa chingii Hitchc. Proc. Biol. Soc. Washington 43: 94. 1930.

Lung Hua, No. 785 (type). In a large dense tussock, up to 1 meter high, in open woods.

Stipa purpurascens Hitchc. Proc. Biol. Soc. Washington 43: 95. 1930.

La Chi Tzu Shan, No. 686 (type). In large tufts on exposed, moist, grassy slopes on steppes. Common.

Height 20 cm.

Stipa sibirica (L.) Lam. Tabl. Encycl. 1: 185. 1791.

First described from Siberia.

Chen Mu Kuan, No. 165. In clay soil on the dry, exposed, western foothills of the Ho Lan Shan. Common.

Height up to 1.5 meters. This species is reported to be poisonous to domestic animals, which either die or become "intoxicated" upon eating it.¹⁸

Stipa splendens Trin. in Spreng. Neu. Entd. 2: 54. 1821.

First described from Transbaikalia.

Shui Ch'ü, No. 8; Yao Chieh, No. 247. Occurs at Shui Ch'ü in tufts over an immense area in both dry and swampy habitats, known locally as "grasslands," and used as pasturage by Mongolians. It is also cut and used as fodder and fuel and in place of sticks in spinning, weaving cloth, and making mats.

Height up to 2.5 meters.

Trisetum spicatum (L.) Richt. Pl. Eur. 1: 59. 1890.

First described from Lapland.

Ta P'an Shan, No. 672, in part; Ch'ia Ch'ing Kou, Nos. 846, 856. Often associated with *Phleum alpinum* on steppes. Common.

Height up to 45 cm. Used as forage.

CYPERACEAE

Carex atrata L. Sp. Pl. 976. 1753 (forma).

First described from the Alps.

T'ai Hua, No. 510. Associated with *Poa arctica* on a moist grass- and bush-covered slope. Common.

Height up to 60 cm.; inflorescence deep purple.

Carex atrata subsp. *pullata* (Boott) Kükenth. in Engl. Pflanzenreich 38 (IV. 20): 400. 1909.

First described from the Himalayan region.

T'ai Hua, No. 528; Ch'ing Kang Yai, No. 576 (?); La Chi Tzu Shan, No. 689; Shih Men, No. 898 (?); A Chüan, No. 989. In tussocks, in open or moist woods or in ravines and on exposed moist steppes. More or less common.

Height up to 80 cm.; spikes greenish purple to deep purple.

Carex caespitosa L. Sp. Pl. 978. 1753, vel aff.

First described from Europe.

Shui Mo Kou, Ho Lan Shan, No. 90; mouth of Hsi Yeh Kou, No. 183. Forming a thick carpet on moist banks of irrigation ditches and streams. Common.

Height 18 cm.

Carex dielsiana Kükenth. Notes Bot. Gard. Edinburgh 8: 10. 1913.

First described from Yunnan.

La Ch'iung Kou, No. 613. In large tufts on exposed, moist, grassy slopes or in woods. Common.

Height 60 cm.; inflorescence purplish brown.

Carex pallida C. A. Meyer, Mém. Acad. Sci. St. Pétersb. 1: 215. pl. 8. 1830.

First described from Kamchatka.

Wang Yeh Fu, No. 26 (immature). In patches on exposed, dry, fine, sandy soil over clay. Fairly common.

Height 20 cm.; inflorescence greenish yellow. This sedge is used also as a soil binder on banks of ditches and sandy slopes.

¹⁸ For a discussion of this phenomenon and the original description of *Stipa inebrians* Hance, based on specimens from this same mountain range, see H. F. Hance, On a Mongolian grass producing intoxication in cattle. Journ. Bot. Brit. & For. 14: 210-212. 1876.

Carex stenophylla Wahl. Vet. Akad. Nya Handl. (Stockholm) **24**: 142. 1803.

First described from northern Europe.

Wang Yeh Fu, No. 126. Along the open margin of a pond. Common.

Height 25 cm.

Cobresia schoenoides (C. A. Meyer) Steud. Syn. Pl. Glum. **2**: 246. 1855.

First described from the Caucasus Mts.

La Chi Tzu Shan, No. 692. In tufts, on an exposed moist steppe. Common.

Height 25 cm.; inflorescence deep purple.

Scirpus maritimus L. Sp. Pl. 51. 1753.

First described from Europe.

Chung Wei, No. 215. On the margin of a stream.

Height 30 cm.

ARACEAE

Arisaema consanguineum Schott, Bonplandia **7**: 27. 1859; Prodr. Syst. Aroid. **52**. 1860 (emend.).

First described from Sikkim.

Ch'ia Ch'ing Kou, No. 836. In woods. Rare.

Height 60 cm.; fruits yellowish red when mature.

JUNCACEAE

Juncus allioides Franch. Nouv. Arch. Mus. Hist. Nat. (Paris) **II**. **10**: 99. 1886 (Pl. David. **2**: 137. 1888).

First described from western Szechwan.

T'ai Hua, No. 507; Shih Men, No. 917. On a moist, densely bushy mountain top and in a partially shaded swamp, forming dense stands. Common.

Height up to 50 cm.; flowering inflorescence whitish.

Juncus bufonius L. Sp. Pl. 328. 1753.

First described from Europe.

Liu Fu Yai, No. 467; Ch'ia Ch'ing Kou, No. 950. Near streams, on frequently flooded, sandy, and gravelly soil and on steppes. Common.

Height 15 cm.

Juncus exploratorum Walker, sp. nov.

Fig. 144

Stolonifer; caules erecti, 55-70 cm. alti; folia basilaria cataphyllina, supremum frondescens, caulina circa 4, frondosa, auriculis destituta; lamina plana, circa 6 mm. lata vel margine tantum involuta; inflorescentia 3-10 cm. longa, bracteis duabus frondescentibus, capitulis longioribus; capitula circa 6; flores 5-8, magni, cum fructu maturo 7 mm. longi, breviter pedunculati; tepala anguste lanceolata, acutissima, subaequilonga vel interna breviora, 4-5 mm. longa, pallida; stamina 6, circa 3 mm. longa; filamenta linearia, basi fusca, antheris linearibus longioribus stylus brevis; fructus trigono-prismaticus, acuminatus vel rostratus, fuscescens vel pallido-castaneus; semina circa 3 mm. longa, scobiforma, albida.

Type in the United States National Herbarium, No. 1245913, collected by R. C. Ching, No. 912, on August 31, 1923, at Shih Men (Gargannar), upper Ch'ia Ch'ing Kou, Min Shan Range, southern Kansu, reported to be common and associated with *Triglochin palustre* on exposed margins of streams where sometimes submerged. An additional specimen examined is *J. F. Rock 13742*, collected in October 1925, in alpine meadows of Mount Kwang Kei, western Tebbu Land, also in the Min Shan Range.

This species seems to resemble most closely *Juncus castaneus* J. E. Smith, from which it differs in its greater height, wider leaves, shorter and paler perianth parts, and paler and more acuminate fruits. It may resemble *Juncus giganteus* Samuelson, described from northern Szechwan, of which no specimens have been seen. *J. exploratorum*, however, seems to be smaller throughout with much fewer heads.



FIGURE 144.—*Juncus exploratorum* Walker, sp. nov.: *A*, Whole plant, $\times \frac{1}{2}$; *B*, fruiting head, $\times 5$; *C*, seeds, $\times 5$.

It is named in honor of the two plant explorers on whose collections this new species is based.

Juncus luzuliformis Gennardi var. **potanini** Buchenau, Bot. Jahrb. Engler 36: Beibl. 82: 15. 1905.

First described from Potanin's Kansu and Szechwan collections.

La Ch'ung Kou, No. 640. In tufts, on densely shaded, rocky cliffs by a stream. Common.

Height up to 18 cm.; flowers white.

LILIACEAE

Aletris glabra Bur. & Franch. Journ. de Bot. 5: 156. 1891.

First described from Szechwan.

Shih Men, No. 931. In a dense forest of *Abies* and *Picea*. Fairly common.

Height up to 75 cm.

Allium chrysanthum Regel, Act. Hort. Petrop. 3^a: 91. 1875.

First described from Przhevalski's collections on the Ta T'ung Ho, Kansu.

T'ai Hua, No. 508; Ta P'an Shan, No. 671; La Chi Tzu Shan, No. 702; A Ch'uan, No. 975. Scattered on exposed moist steppes or densely bushy mountain sides. Common to abundant.

Flowers yellowish green. The bulbs are edible.

Allium cyaneum Regel, Act. Hort. Petrop. 3^a: 174. 1875.

First described from Przhevalski's collection on the Ta T'ung Ho, Kansu.

Ho Lan Shan, No. 1121. On a shaded, mossy forest floor.

Height 30 cm.; flowers purple.

Allium forrestii Diels, Notes Bot. Gard. Edinburgh 5: 302. 1912.

First described from Yunnan.

Ho Lan Shan, No. 1107. At edge of woods. Common.

Height 30 cm.; flowers purplish.

Allium henryi C. H. Wright, Kew Bull. Misc. Inf. 1895: 119. 1895.

First described from Hupeh.

Ch'ia Ch'ing Kou, No. 839. In tufts on a mossy forest floor. Common.

Height up to 45 cm.; flowers bluish purple.

Allium kansuense Regel, Act. Hort. Petrop. 10: 690. 1889.

First described from Przhevalski's Kansu collections.

La Ch'ing Kou, No. 623; Upper Ch'ia Ch'ing Kou, No. 864; Labrang, No. 771. Sometimes forming dense tussocks, in partially shaded woods or on open, exposed, moist slopes. Common.

Height up to 50 cm.; flowers blue to turquoise.

Allium rubellum Bieb. Fl. Taur. Cauc. 1: 264. 1808.

First described from the southern Caucasus region.

Lien Ch'eng, No. 296. On an exposed, bare, clay cliff. Rare.

Height up to 55 cm.; flowers purplish.

Allium tenuissimum L. Sp. Pl. 301. 1753.

First described from Siberia.

Shui Mo Kou, near Lien Ch'eng, No. 363; Ho Lan Shan, Nos. 1094, 1106 (infected with *Puccinia porri* (Sow.) Wint.). On exposed, grassy or moist, rocky slopes. Common.

Height up to 25 cm.; flowers purplish, fragrant.

Allium victorialis L. Sp. Pl. 295. 1753.

First described from the Alps.

Shui Mo Kou, near Lien Ch'eng, No. 348. In woods.

Height 60 cm.; flowers purplish.

Allium sp.

La Chi Tzu Shan, No. 690. Scattered, on an exposed, moist steppe. Common.
Height up to 38 cm.; flowers yellowish green; basal bulbs small.

Asparagus brachyphyllus Turcz. Bull. Soc. Nat. Moscou 1840: 78. 1840.

First described from northern China.

Mouth of Hsi Yeh Kou, No. 178. On a dry, exposed foothill. Rare.

Height up to 1 meter; flowers purplish green.

Asparagus trichophyllus Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 139. 1833 (Enum. Pl. China Bor. 65. 1835).

First described from Hopeh.

Hsi Mi Yai, No. 491. On dry, exposed, clay stream banks, sometimes forming a dense carpet. Very common.

Height up to 1 meter; flowers said to be red.

Clintonia udensis Trautv. & Mey. in Midd. Reise Nord Ost. Sibir. 1², Suppl.: 92. 1856 (Fl. Ochot. 92. 1856).

First described from Priamur, Primorsk region.

Shih Men, No. 932. In a dense forest of *Abies* and *Picea*. Common.

Height up to 1 meter; fruit dark green.

Lloydia tibetica Baker var. *purpurascens* Franch. Journ. de Bot. 12: 193. 1898.

First described from Yunnan.

Ha La Hu Kou, No. 54; Ta P'an Shan, No. 675; Ho Lan Shan, No. 1148. On exposed, moist, rocky cliffs or other exposed places. Common, except at Ta P'an Shan.

Height up to 60 cm.; flowers white or yellowish with a purple stripe on back of perianth.

Maianthemum bifolium (L.) DC. in Lam. & DC. Fl. Franç. ed. 3, 3: 177. 1805.

First described from northern Europe.

T'u Er P'ing, No. 429. In woods.

Height up to 30 cm.; flowers creamy white.

Polygonatum fuscum Hua, Journ. de Bot. 6: 444. 1892.

First described from Yunnan.

Ho Lan Shan, No. 1135. In woods.

Stem slender, up to 2 meters high; flowers white.

Polygonatum multiflorum (L.) All. Fl. Pedem. 1: 131. 1785.

First described from Europe.

Pei Ssu Kou, No. 119. Under bushes in a forest. Common.

Height 36 cm.; flowers greenish yellow.

Polygonatum sibiricum Delmar in Redoute, Liliac. 6: pl. 315. 1812.

First described from Siberia.

Upper Shui Mo Kou, near Lien Ch'eng, No. 395. In woods. Rare.

Height 60 cm.; flowers greenish white.

Smilax stans Maxim. Bull. Acad. Sci. St. Pétersb. 17: 170. 1872. (Mél. Biol. Acad. Sci. St. Pétersb. 8: 407. 1872).

First described from Japan.

Shui Mo Kou, near Lien Ch'eng, No. 346. In woods.

Streptopus amplexifolius (L.) DC. in Lam. & DC. Fl. Franç., ed. 3, 3: 174. 1805.

First described from Europe.

Tai Wang Kou, No. 439. At the base of a rocky cliff in a forest.

Height up to 60 cm.; flowers purplish.

Tofieldia yunnanensis Franch, Journ. de Bot. **12**: 225. 1898.

First described from Yunnan.

A Chüan, No. 972. On a shaded, rocky cliff. Rare.

Height 12 cm.; flowers yellowish green.

DIOSCOREACEAE

Dioscorea quinqueloba Thunb. Fl. Japon. 150. 1784.

First described from Japan.

Shui Mo Kou, near Lien Ch'eng, No. 357. On a bushy slope.

A climbing herb, 6 meters long; flowers white.

IRIDACEAE

Iris ensata Thunb. Trans. Linn. Soc. **2**: 328. 1794.

First described from Japan.

Wang Yeh Fu, No. 37; Liu Fu Yai, No. 476; Cho Ni, No. 993. In pure stands of great extent along roadsides, in either wet or dry places. Common.

Height up to 90 cm.; flowers purple; seeds brown.

Iris aff. polysticta Diels, Svensk. Bot. Tidskr. **18**: 428. 1924.

First described from Szechwan.

T'u Er P'ing, No. 408. In woods. Rare.

Height 45 cm.; flowers violet. Differs from other species in the form of growth, one stem appearing isolated, not in tufts.

Iris tenuifolia Pall. Reise Prov. Russ. Reich. **3**: 714. *pl. C.* 1776.

First described from Dahuria.

Ti Shui Kou, No. 21; Shui Mo Kou, Ho Lan Shan, No. 95. Along exposed, dry roadsides or on foothills of coarse sand and gravel. Rare, isolated.

Height up to 40 cm.; flowers appearing soon after the leaves, the outer petals pale, the middle one marked with deep violet lines inside. The leaves are made into ropes and the roots into brushes, because of their great toughness when dried.

Iris ventricosa Pall. Reise Prov. Russ. Reich. **3**: 712. *pl. B.* 1776.

First described from Dahuria.

Wang Yeh Fu, No. 27; Nan Ssu Kou, No. 132. In large compact clusters, along dry sandy roadsides and on moist, rich farm land. Very common.

Height 30 to 60 cm.; flowers deep purple.

ORCHIDACEAE

Cypripedium fasciolatum Franch. Journ. de Bot. **8**: 232. 1894.

First described from Szechwan.

Shih Men, No. 933. In dense woods. Rare.

Height 38 cm.

Habenaria bifolia R. Br. in Ait. Hort. Kew, ed. 2, **5**: 193. 1813.

First described from Europe.

T'u Er P'ing, No. 349. In a dense *Picea* forest. Ch'ing Kang Yai, No. 570. In woods. Rare.

Height up to 60 cm.; flowers creamy white or yellowish green, the anthers orange-yellow.

Habenaria conopsea (Willd.) Benth. Journ. Linn. Soc. Bot. **18**: 354. 1881.

First described from Europe.

Shih Men, No. 928. On steppes. Rare.

Height 50 cm.

Habenaria cucullata (L.) Hoefft. Cat. Pl. Kursk. 56. 1826.

First described from Europe.

Ch'ia Ch'ing Kou, No. 838. On a mossy forest floor. Common.

Height 20 cm.; flowers pink, very fragrant; leaves mottled with brown above.
Herminium tanguticum Rolfe, Journ. Linn. Soc. Bot. 36: 51. 1903.

First described from Przhevalski's Kansu collections.

Liu Fu Yai, No. 462. On a moist rocky cliff. Very rare.

Height up to 23 cm.; flowers greenish yellow, highly fragrant. The tuberous root is said to be edible.

Orchis chusua D. Don, Prodr. Fl. Nepal. 23. 1825.

First described from Nepal.

T'u Er P'ing, No. 428; Liu Fu Yai, No. 473. In forests. Common.

Height up to 40 cm.; flowers purplish, dotted inside with deeper colored spots.

Spiranthes sinensis (Pers.) Ames, Orchid. 2: 53. 1908.

First described from Canton, China.

Shang Hsin Chuang, No. 679. Scattered on exposed, moist grassland. Common.

Height 20 cm.; flowers reddish, sweetly fragrant.

SALICACEAE

Populus cathayana Rehd. Journ. Arn. Arb. 12: 59. 1931.

First described from Szechwan, Kansu (Ching's collections), Mongolia, Manchuria, and Korea.

Ha La Hu Kou, No. 75; Shui Mo Kou, near Lien Ch'eng, No. 482. Common throughout the province, often along roads or on stream banks.

A tree, up to 25 meters high. This species is useful as a street tree, casting a dense shade.

Populus euphratica Olivier, Voy. Emp. Othoman. 3: 450; atlas pl. 45, 46. 1807.

First described from Persia.

Ta Shui Kou, No. 23. On exposed, coarse, sandy soil. Rare, only two trees seen.

A tree, up to 13 meters high.

Populus simonii Carr. Rev. Hort. (Paris) 39: 360. 1867.

First described from "Si Wan Tzu", southern Mongolia.

Ningsia, No. 225. In cultivation on a farm. Common.

A tree, up to 18 meters high.

Populus suaveolens Fisch. Allg. Gartenz. 9: 404. 1841.

First described from eastern Siberia.

Hsi Mi Yai, No. 505. Along moist roadsides in gorges, sometimes forming fine avenues. Common.

A tree, up to 30 meters high, the trunk straight, up to 1 meter in diameter, the bark dark gray on old trees, smooth gray on young trees, the crown umbrella-shaped.

Populus tremula L. var. **dauriana** C. Schneid. in Sarg. Pl. Wils. 3: 24. 1916.

First described from Hupeh, Szechwan, Hopeh, etc.

Wang Yeh Fu, No. 40. Cultivated along roadsides with *Salix*, *Picea*, and *Juniperus*.

Height up to 10 meters.

Salix caprea L. Sp. Pl. 1020. 1753.

First described from Europe.

Ha La Hu Kou, Nos. 59 ♀, 60 ♂.¹⁰ On sheltered, moist valley bottoms and foothills. Fairly common. Mountains south of Ha La Hu Kou, No. 77. In an open *Picea* forest on moist, rich soil.

¹⁰ See footnote to *S. wallichiana* Anders, p. 607.

A rather small tree, up to 9 meters in the first locality, branched near the ground; bark greenish gray, fissured on the trunk.

Salix cheilophila C. Schneid. in Sarg. Pl. Wils. 3: 69. 1916.

First described from western Szechwan.

Lien Ch'eng, No. 284, Hsi Mi Yai, No. 485. Along mountain streams. Common.

A shrub, up to 5 meters high, in dense stands, the branchlets brown, shining; capsules greenish.

Salix chingiana Hao, Repert. Sp. Nov. Fedde Beih. 93: 86. 1936.

Lang Tzu T'ang Kou, No. 584 (type). Forming dense thickets in *Betula* woods. Common.

Height up to 6 meters; leaves glaucous beneath.

Salix dissa C. Schneid. in Sarg. Pl. Wils. 3: 52. 1916.

First described from Szechwan.

Lung Hua, No. 791. In a forest of *Picea* and *Betula*. Common.

A shrub, up to 4.5 meters high.

Salix matsudana Koidz. Bot. Mag. Tokyo 29: 312. 1915.

First described from Umemura's Kansu collections.

Wang Yeh Fu, Nos. 30♂, 31♀. Cultivated, in clay soil on a farm, associated with *Ulmus* and *Populus*. Fairly common.

Height 15 meters. The wood is used for farm implements.

Salix melea C. Schneid. in Sarg. Pl. Wils. 3: 176. 1916.

First described from W. Purdom's collections, without precise locality, possibly from Kansu.

T'u Er P'ing, No. 426. In a forest. Ho Lan Shan, No. 1054. Along streams. Common.

Height up to 6 meters; dense; branches dull brown; leaves glaucous beneath.

Salix microstachya Turcz. Mém. Acad. St. Pétersb. Sav. Étrang. 3: 628. pl. 4. 1837 (Salicet. 21. pl. 4. 1837).

First described from Baical or Dahuria.

Ha La Hu Kou, Nos. 71♀, 72♂; Ho Lan Shan, No. 1052. The commonest species along streams, forming almost impenetrable thickets.

A dense shrub, up to 6 meters high, the branchlets brownish purple, tough; fruits persistent for a whole year, the capsules greenish yellow.

Salix paraplesia C. Schneid. in Sarg. Pl. Wils. 3: 40. 1916.

First described from western Szechwan.

T'u Er P'ing, No. 433; Labrang, No. 779. In forests. Common.

A tree or shrub, up to 9 meters high.

Salix phylicifolia L. Sp. Pl. 1016. 1753.

First described from northern Sweden.

T'ai Hua, No. 526. On a moist, exposed slope and in a ravine.

A shrub, 2 meters high, the branches exceedingly tough. Rare.

Salix plocotricha C. Schneid. in Sarg. Pl. Wils. 3: 49. 1916.

First described from western Szechwan.

Lung Hua, No. 808. A shrub up to 7 meters high; associated with *Picea*, *Betula*, and *Abies*, generally much branched. Common. Upper Ch'ia Ch'ing Kou, No. 858.²⁰ A low shrub up to 60 cm. high; forming a dense, flat-topped scrub of large extent. Common.

Stems propagating very rapidly by suckers and rhizomes.

²⁰ This is Görz's determination. K. S. Hao, in Repert. Sp. Nov. Fedde Beih. 93: 87. 1936, considers this as *S. spathulifolia* Seemen, Bot. Jahrb. Engler 36, Beibl. 82: 31. 1905.

Salix wallichiana Anders. Svensk. Vet. Akad. Handl. 1850: 477. 1851.

First described from Nepal.

Nan Ssu Kou, No. 143.²¹ In dry, rocky stream bottoms. Rather common.

A much-branched shrub, up to 3 meters high, the branches shining brown.

Salix wuiana Hao, Repert. Sp. Nov. Fedde Beih. 93: 95. 1936.

First described from Kansu (Ching) and Shensi.

T'u Er P'ing, No. 425. One of the principal species in these forests along with *Betula*, *Populus*, and *Picea*.

JUGLANDACEAE

Juglans regia L. Sp. Pl. 997. 1753.

First described without locality.

Near Ningsia, No. 206. Cultivated on farms. Common.

A tree, up to 20 meters high, the trunk 1 meter in diameter. Valued for its nuts and lumber.

BETULACEAE

Betula albo-sinensis Burkill, Journ. Linn. Soc. Bot. 26: 497. 1899.

First described from Szechwan.

T'u Er P'ing, No. 448; Lung Hwa, No. 799. In *Picea* and *Abies* forests, but less common than the other species of *Betula*. Common.

A tree, up to 14 meters high; bark dark brown, smooth. The wood is used for farm implements.

Betula albo-sinensis var. **septentrionalis** C. Schneid. in Sarg. Pl. Wils. 2: 458. 1916.

First described from western Szechwan.

T'u Er P'ing, Nos. 449, 450. One of the dominant forest species, in pure stands on certain parts of the mountains.

A tree, up to 24 meters high; bark dark brown or orange-red, the inner layers brownish yellow, peeling off in thin sheets. The wood is used for farm implements and bowls, the bark in thin sheets for wrapping food.

Betula japonica Sieb. in Winkler in Engl. Pflanzenreich 19 (IV. 61): 78. 1904.

First described from Japan.

Shui Mo Kou, near Lien Ch'eng, No. 322; T'u Er P'ing, No. 447; Tai Hua, Nos. 538, 554. A common forest species.

A tree, up to 14 meters high; bark brownish gray, curling; petioles red. The wood is used for farm implements.

Corylus sieboldiana Blume var. **mandschurica** (Maxim.) C. Schneid. in Sarg. Pl. Wils. 2: 454. 1916.

First described from Manchuria.

Shui Mo Kou, near Lien Ch'eng, No. 347; Wa P'ing Hsiang, No. 1023. In mixed broad-leaved forests, often forming dense thickets. Common.

A shrub, up to 4 meters high. The greenish-brown, bristly nuts are edible and are sold in the markets.

Ostryopsis davidiana Decaisne, Bull. Soc. Bot. France 20: 155. 1873.

First described from Mongolia.

Pei Ssu Kou, No. 115; Shui Mo Kou, near Lien Ch'eng, No. 351. In mixed forests of *Pinus*, *Populus*, and *Acer*, on slopes of crumbled, black shale and clay, often forming an almost impenetrable thicket. Common at 2,100 meters altitude.

A shrub, up to 2 meters high.

²¹ This is Görz's determination. K. S. Hao, in Repert. Sp. Nov. Fedde Beih. 93: 91. 1936, considers this as *S. caprea* L.

FAGACEAE

Quercus mongolica Fisch. in Turcz. Bull. Soc. Nat. Moscou 11: 101. 1838.

First described from Mongolia.

Ha Ho, No. 1015. Associated with *Ulmus*, *Populus*, *Acer*, and *Pinus* in woods; also found isolated on exposed, dry slopes. Common.

A tree, up to 12 meters high. The wood is used for axles and mule saddles.

ULMACEAE

Ulmus glaucescens Franch. Nouv. Arch. Mus. Hist. Nat. (Paris) II. 7: 77. *pl.* 8. 1884 (Pl. David. 1: 267. *pl.* 8. 1884).

First described from A. David's Mongolian collections.

I T'ai K'uei, No. 15. An isolated tree, 18 meters high in an open garden, branching from the ground into four stems; branches smooth, gray, the branchlets greenish gray, slender. The wood is used for farm implements; the matured fruit is said to be edible. Shui Mo Kou, Ho Lan Shan, No. 88; Nan Ssu Kou, No. 140. Growing by itself on rocky slopes from valley bottom to summit. Common.

A small tree, 5 to 8 meters high or sometimes stunted into a dwarf bush; bark dark gray, deeply fissured. This is a good street tree and is so used in Pei Ssu Kou, where its crown is umbrella-shaped.

Professor Rehder has commented on this species and these collections (Journ. Arn. Arb. 11: 156-157. 1930) as follows: "This species which has been known so far only from David's collection near Sartchy or Sarchi about 20 miles west of the border of Northern Shansi has now turned up east and west of this locality, namely in northern Chihli, at another locality in Mongolia west of Sarchi and in Kansu. It is very similar to *Ulmus pumila* L. and like this it has small glabrous leaves with simple or nearly simple teeth, but the leaves are dull, somewhat bluish green above, comparatively shorter and broader, with fewer, usually 7-9 pairs of veins, while *U. pumila* often has more than 10 pairs of veins. The chief difference is in the fruit, which is broadly elliptic or elliptic-obovate, more or less narrowed at base and 2 to 2.5 cm. long, while in *U. pumila* the samaras are suborbicular, rounded at base and not more than 15 mm. long."

Ulmus glaucescens var. **lasiocarpa** Rehder, Journ. Arn. Arb. 11: 157. 1930.

Hsi Yeh Kou, No. 160 (type).

On dry, exposed, rocky slopes and along roadsides. Very common in the lower parts of this valley.

A small tree, up to 5 meters high; trunk short, 10 cm. in diameter, the crown umbrella-shaped; bark brownish gray, smooth; fruit abundant (May 24, 1923).

Professor Rehder's comments accompanying the original description are as follows: "This interesting variety which differs from the type in its pilose samaras resembles in this character *U. davidiana* Planch. and *U. macrocarpa* Hance, which, however, differ in their much larger doubly serrate and generally obovate leaves, pubescent in *U. davidiana*, scabrid in *U. macrocarpa*. No other species of *Ulmus* is known which varies with pubescent and glabrous fruit, but as this plant agrees in every other character perfectly with typical *U. glaucescens* and grows with it at the same locality, it can hardly be considered anything else but a variety or form of that species."

Ulmus japonica Sarg. Trees & Shrubs 2: 1. *pl.* 101. 1907.

First described from Japan.

Tai Wang Kou, No. 444. Along exposed roadsides. Very common in the lower part of the gorge.

A tree, up to 8 meters high, the trunk short, crooked; twigs 4-angled with thick, corky ridges.

Ulmus macrocarpa Hance, Journ. Bot. Brit. & For. 6: 332. 1868.

First described from Jehol, Mongolia.

Pao T'ou, Mongolia, No. 1 (determination doubtful). A commonly cultivated tree not found wild, often of great size (up to 24 meters), the trunk often not branching below 8 meters from the base, the crown round; bark dark gray, deeply fissured; branchlets slender, often fascicled or whorled. Wu Yüan Hsien, No. 10. A fairly common tree, especially in the southern rocky ravines in the foothills of the Ho Lan Shan, up to about 8 meters high, the trunk short, crooked, irregularly furrowed, the crown rounded, with long, slender, gray, smooth branches. The wood is used for furniture, farm implements, and interior finishing.

Ulmus pumila L. Sp. Pl. 226. 1753.

First described from Siberia.

Wang Yeh Fu, No. 32. Cultivated on farms, associated with willows. Common.

A tree, up to 18 meters high. The wood is used for farm implements.

MORACEAE

Cannabis sativa L. Sp. Pl. 1027. 1753.

First described from India.

Shang Hsin Chuang, No. 681. On exposed moist grassland. Common.

Height 50 cm.; flowers yellowish green.

Humulus lupulus L. Sp. Pl. 1028. 1753.

First described from Europe.

Hsin Ch'eng, south of Lanchow, No. 1040. Climbing on fences along a moist, clay roadside. Common.

Stem up to 10 meters long; flowers creamy white, fragrant.

Morus alba L. Sp. Pl. 986. 1753.

First described from China.

Huang Hsi Kou, No. 200. Seems to be cultivated on dry, gravelly foothills. Rare.

A shrub, up to 5 meters high.

URTICACEAE

Urtica laetevirens Maxim. Bull. Acad. Sci. St. Pétersb. 22: 236. 1876 (Mél. Biol. Acad. Sci. St. Pétersb. 9: 620. 1877).

First described from Hokkaido, Japan.

Lung Hua, No. 810. In a forest. Common.

Height up to 1 meter; stems purple; flowers greenish.

Urtica triangularis Hand.-Mazz. Symb. Sin. 7: 110. 1929.

First described from Szechwan and Yunnan.

T'ai Hua, No. 542. In woods and shady places. Common.

Height up to 1 meter; flowers purplish green. The sting is very painful to animals.

LORANTHACEAE

Viscum album L. Sp. Pl. 1023. 1753, vel aff.

First described from Europe.

Ha Ho, No. 1044. In large clumps (1.8 meters) hanging from the branches of *Populus*, *Ulmus*, and *Acer*. Common.

BALANOPHORACEAE

Balanophora sp.

Chen Fan Ch'üan Tzu, No. 14. On the lee of an exposed dune of fine loose sand.

A root-parasite (host not indicated), 18 cm. high, only the upper 3 cm. exposed above the sand and bearing a purplish-red inflorescence, the covered parts deep brown, succulent. This plant is said to be edible and to be used as a medicine for rheumatism.

POLYGONACEAE

Atraphaxis lanceolatum (Ledeb.) Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 7: 483. 1851.

First described from the Altai Mountains.

Chung Wei, No. 222. On a dry, exposed slope of hard clay. Rare.

A shrub, up to 1.3 meters high; branches distinctly brownish gray; flowers purplish.

Koenigia islandica L. Mant. Pl. 1: 35. 1767.

First described from Iceland.

Lang Tzu T'ang Kou, No. 593. In a dense patch, partially submerged in a stream under a high rocky cliff.

Height 15 cm.; flowers white, terminal.

Polygonum amphibium L. Sp. Pl. 351. 1753.

First described from Europe.

Lien Ch'eng, No. 315. In a flowing stream. Rare.

Height 60 cm.; flowers purplish.

Polygonum auberti L. Henry, Rev. Hort. (Paris) 79: 82. fig. 23, 24. 1907.

First described from Szechwan.

Lien Ch'eng, No. 375. In woods.

Height up to 1 meter; flowers pink.

Polygonum aviculare L. Sp. Pl. 362. 1753.

First described from Europe.

Lien Ch'eng, No. 319; Ho Lan Shan, No. 1093. On edges of moist fields and along roadsides. Common.

Height up to 40 cm.; flowers pink.

Polygonum cyanandrum Diels, Notes Bot. Gard. Edinburgh 5: 257. 1912.

First described from Yunnan.

T'ai Hua, No. 517. Forming pure stands of small area in open woods. Common.

Height up to 60 cm.; flowers white.

Polygonum lapathifolium L. var. **salicifolium** Sibth. Fl. Oxon. 129. 1794.

First described from Europe.

Lien Ch'eng, No. 317. On a frequently submerged, gravelly beach.

Flowers purplish.

Polygonum macrophyllum D. Don, Prodr. Fl. Nepal. 70. 1825.

First described from Nepal, India.

T'ai Hua, No. 537; upper Ch'ia Ch'ing Kou, No. 876; Ho Lan Shan, No. 1050. On exposed, moist mountain tops and on steppes. Common.

Height up to 50 cm.; flowers white, fragrant, the anthers deep purple.

Polygonum nepalense Meisn. Monog. Pl. Polygon. 84. pl. 7. fig. 2. 1826.

First described from Nepal, India.

Shih Men, No. 915. On an exposed moist clay roadside. Common.

Height 24 cm.; flowers reddish.

Polygonum pilosum (Maxim.) Forbes & Hemsl. Journ. Linn. Soc. Bot. 26: 345. 1891.

First described from Przhivalski's Kansu collections.

Lang Tzu T'ang Kou, No. 594. In dense patches in dense woods. Common.

Flowers white.

Polygonum sibiricum Laxm. Nov. Comm. Acad. Sci. Petrop. 18: 531. *pl.* 7. *fig.* 2. 1774.

First described from the Altai Mountains.

Chung Wei, No. 217; Yao Chieh, No. 269; Ho Lan Shan, Nos. 1116, 1133. Gregarious, beside cultivated fields, streams, and ponds and in swamps. Common.

Height up to 50 cm.; flowers greenish yellow.

Polygonum tataricum L. Sp. Pl. 364. 1753.

First described from Tataria.

Yao Chieh, No. 273. On margins of cultivated fields.

Height 75 cm.

Polygonum viviparum L. Sp. Pl. 360. 1753.

First described from Europe.

Shui Mo Kou, near Lien Ch'eng, No. 353; T'u Er P'ing, No. 456; Ho Lan Shan, No. 1065. On moist grassland on ridges and as undergrowth in *Picea* forests. Common.

Flowers white, fragrant.

Rheum delavayi Franch. Bull. Mus. Hist. Nat. Paris 1: 212. 1895.

First described from Yunnan.

La Chi Tzu Shan, No. 705. On partially shaded, very moist steppes. Common.

Height 30 cm.; flowers green, tinged on margin with deep red.

Rheum leucorrhizum Pall. Nov. Act. Acad. Sci. Petrop. 10: 381. 1797.

First described from Siberia.

Nan Ssu Kou, No. 148. On a dry, exposed, gravelly, and rocky valley bottom. Common locally.

Height up to 75 cm.

Rheum sp.

Wang Yeh Fu, Nos. 28, 128. On dry, exposed sand over clay or along gravelly and sandy roadsides. Very rare.

Height up to 20 cm., the rootstock tuberous, succulent, soft, with bright-yellow pith; flowers red, highly fragrant.

Rumex crispus L. Sp. Pl. 335. 1753.

First described from Europe.

Mouth of Hsi Yeh Kou, No. 175. Beside an artificial ditch in clay soil. Common.

Height up to 1 meter.

Rumex gmelini Turcz. Bull. Soc. Nat. Moscou 1838: 100. 1838; 25²: 444. 1852.

First described from the Baikal region.

La Ch'iung Kou, No. 624. On an exposed moist grassy slope. Common.

Height up to 1.2 meters; flowers reddish green.

Rumex nepalensis Spreng. Syst. Veg. 2: 159. 1825.

First described from Nepal, India.

Lung Hua, No. 786. In a dense formation along exposed moist roadsides in rich soil. Common.

Height up to 1.3 meters; fruit brownish red. Root used medicinally.

CHENOPODIACEAE

Parthrophytum arborescens Litvinov, Trav. Mus. Bot. Acad. Sci. St. Pétersb. 11: 44. 1913.

First described from Turkestan.

Chia Ku K'ou, No. 24a. On a moving sand dune.

A shrub. This is the host plant for *Phelipaea salsa* C. A. Meyer, vel. aff.

Chenopodium botrys L. Sp. Pl. 219. 1753.

First described from Europe.

Lung Hua, No. 789. On an exposed, moist roadside in rich soil. Common.

Height up to 45 cm.

Chenopodium hybridum L. Sp. Pl. 219. 1753.

First described from Europe.

Yao Chieh, No. 274. On a moist, clay bank.

Height 60 cm.; flowers greenish.

Eurotia ceratoides (Willd.) C. A. Meyer, in Ledeb. Fl. Alt. 4: 239. 1833.

First described from Moravia, Tataria, Armenia, and Arabia.

Lien Ch'eng, No. 370. On a dry, exposed, rocky roadside. Common.

A dense herb, 1 meter high; flowers greenish red.

Halopeplis sp.

Hsün Hua Hsien, No. 736. In a dry region. Common.

A dense bushy plant, up to 40 cm. high; leaves very succulent, swollen.

Kalidium foliatum (Pall.) Moq. in DC. Prodr. 13²: 147. 1849, vel aff.

First described from the Caspian Sea region.

Shui Ch'ü, No. 7. In wet places on open alkaline deserts, forming pure stands that cover very extensive areas.

A dwarf shrub, up to 45 cm. high, branching profusely from the ground and producing suckers freely. It is used for fuel and for fodder for camels because of its salty taste.

Salsola arbuscula Pall. Reise Prov. Russ. Reich. 1: 487. *pl. G.* 1771.

First described from "deserto Tatarico."

Yao Chieh, No. 261. On dry, bare, exposed, clay slopes.

A semiwoody shrub, 60 cm. high. The branches bear many insect galls.

Salsola kali L. Sp. Pl. 222. 1753.

First described from Europe.

San Ta Lai Ssu, No. 726. Forming dense, pure stands of considerable extent along exposed, moderately moist, clay roadsides. Common.

Height up to 40 cm.; flowers pink.

Suaeda obtusifolia (Bunge) Trautv. Bull. Soc. Nat. Moscou 40²: 62. 1867.

First described from the Caspian Sea region.

Yao Chieh, No. 262. On a dry, bare, clay cliff.

A semiwoody shrub.

Suaeda stauntonii Moq. Chenop. 131. 1840.

First described from China.

Yao Chieh, No. 243. On a bare, dry, hard, clay cliff.

Height 30 cm.

CARYOPHYLLACEAE

Arenaria cerastiformis F. N. Williams, Journ. Linn. Soc. Bot. 38: 402. 1909.

First described from Tibet.

Ta P'an Shan, No. 674; La Chi Tzu Shan, No. 697. On exposed, moist, bare, loose slopes. Common.

Flowers pure white, faintly tinged with purple; calyx purplish green; anthers deep purple.

Arenaria holosteoides Edgew. in Hook. f. Fl. Brit. Ind. 1: 241. 1874.

First described from Himalaya and western Tibet.

Yao Chieh, No. 297. On the edge of a cultivated field.

A prostrate herb, 30 cm. long; flowers white.

Arenaria kansuensis Maxim. Bull. Acad. Sci. St. Pétersb. **26**: 428. 1880 (Mél. Biol. Acad. Sci. St. Pétersb. **10**: 579. 1880).

First described from Przhevalski's Kansu collections.

Ta P'an Shan, No. 652. On an exposed, moist, alpine summit. Rare.

Height 3 cm.; flowers greenish yellow.

Arenaria przewalski Maxim. Bull. Acad. Sci. St. Pétersb. **26**: 428. 1880 (Mél. Biol. Acad. Sci. St. Pétersb. **10**: 578. 1880).

First described from Przhevalski's Kansu collections.

La Chi Tzu Shan, No. 694. Forming dense patches on exposed, moist steppes. Common.

Petals pure white; sepals greenish purple; anthers purple. This herb is very ornamental, decorating the grasslands with a mass of white.

Arenaria spp.

1. Pei Ssu Kou, No. 116. Rare, on a shaded, moist stream bank in a pine forest.

2. Ho Lan Shan, No. 1069. In tough tufts on steppe. Common.

Cerastium vulgatum L. Fl. Suec. ed. 2, 158. 1755.

First described from Sweden.

T'ai Hua, No. 520; Ta P'an Shan, No. 669; Middle Tu I Kou, No. 964; Ho Lan Shan, No. 1079. On exposed, moist, grassy slopes or in forests and open woods. Common.

Height up to 40 cm.; flowers white.

Dianthus chinensis L. Sp. Pl. 411. 1753.

First described from China.

Near Ch'ien Kou, No. 1012. On exposed, moist steppes along the roadside. Fairly common.

Height 34 cm.; flowers purple on opening, later turning pink, fragrant.

Dianthus superbus L. Amoen. Acad. **4**: 272. 1788.

First described from Europe.

T'u Er P'ing, No. 457; La Chi Tzu Shan, No. 713; Ho Lan Shan, No. 1127. On exposed, moist foothills and steppes. Usually common.

Height 45 cm.; flowers pink.

Gypsophila davurica Turcz. in Ledeb. Fl. Ross. **1**: 294. 1842.

First described from Dahuria.

Lanchow, No. 240; Liu Fu Yai, No. 477. On bare, dry, clay cliffs or by moist roadside. Common.

Height up to 75 cm.; flowers white or bluish.

Gypsophila gmelini Bunge, in Ledeb. Fl. Alt. **2**: 128. 1830.

First described from the Altai Mountains.

Ho Lan Shan, No. 1067. Along an exposed, dry roadside. Common.

Height 20 cm.; flowers pink.

Lychnis apetala L. Sp. Pl. 437. 1753.

First described from Lapland and Siberia.

La Ch'iung Kou, No. 639. On exposed, moist foothills. Rare.

Flowers greenish, the tip of the petals purplish.

Lychnis sp.

Ho Lan Shan, No. 1130. On steppes.

Height 45 cm.; flowers greenish yellow.

Silene conoidea L. Sp. Pl. 418. 1753.

First described from Europe.

Ningsia, No. 207. On grasslands along streams. Rare.

Flowers pink.

Silene repens Patrin, in Pers. Syn. Pl. 1: 500. 1805.

First described from Siberia.

La Chi Tzu Shan, No. 721; Ho Lan Shan, No. 1131. On partially shaded cliffs and slopes. Common.

Height 30 cm.; flowers white.

Silene tenuis Willd. Enum. Pl. Hort. Berol. 474. 1809.

First described from the Baikal region.

Liu Fu Yai, No. 463. On moist slopes. Rare.

Height up to 75 cm.; several stems coming from one root; flowers greenish purple.

Stellaria graminea L. Sp. Pl. 422. 1753.

First described from Europe.

T'u Er P'ing, No. 372. On moist grasslands.

Height 36 cm.; flowers white.

Stellaria graminea var. *pilosula* Maxim. Fl. Tangut. 91. 1889.

First described from Przhevalski's collections from Amdo, eastern Tibet.

Lower Tu I Kou, No. 960. In dense tussocks along shaded roadsides. Rare.

Height up to 45 cm.; fruit yellowish brown.

Stellaria infracta Maxim. Act. Hort. Petrop. 11: 72. 1890.

First described from Potanin's and Piasetski's Hopeh, Kansu, and Szechwan collections.

Pei Ssu Kou, No. 192. In a compact cluster on a rocky cliff. Rare.

Height 50 cm.; flowers white.

RANUNCULACEAE

Aconitum excelsum Reichenb. Illustr. Spec. Aconiti Gen. pl. 53. 1827.

First described from Siberia.

Shui Mo Kou, near Lien Ch'eng, No. 334. In woods.

Height up to 1.2 meters, the stem often procumbent at base; flowers purple.

Aconitum gymnandrum Maxim. Bull. Acad. Sci. St. Pétersb. 23: 308. 1877

(Mél. Biol. Acad. Sci. St. Pétersb. 9: 711. 1877).

First described from Przhevalski's Kansu collections.

Lien Ch'eng, No. 279. Along moist, clay roadsides.

Height 1 meter; flowers blue.

Aconitum szechenyianum Gáy. Magyar Bot. Lap. 8: 127. 1909.

First described from Széchenyi's Kansu collections.

La Ch'iung Kou, No. 620; Shih Men, No. 921. Fairly common on steppes and grassy slopes.

Height 45 cm. to 1.2 meters; stems purple; flowers deep purple (No. 921) or greenish yellow (No. 620).

Aconitum tanguticum (Maxim.) Stapf, Ann. Bot. Gard. Calcutta 10: 151. 1905.

First described from Przhevalski's collections from Amdo, eastern Tibet.

Ta P'an Shan, No. 668; La Chi Tzu Shan, No. 708; Ch'ia Ch'ing Kou, No. 943. On exposed, moist, grassy slopes, and rocky cliffs, and along roadsides. Common.

Height up to 60 cm.; flowers bluish purple; anthers deep purple.

Aconitum volubile Pall. Enum. Hort. Dimidof. 21. 1781 (*nomen nudum*);

Koelle, Spic. Obs. Aconito 21. 1787.

First described from the Altai Mountains.

Ni Ma Lang Kou, No. 758; Ch'ia Ch'ing Kou, No. 946. Climbing on bushes in woods. Fairly common.

Length up to 4.5 meters; flowers purple.

Aconitum sp.

Upper Ch'ia Ch'ing Kou, No. 850. In dense stands in woods, partially shaded. Common.

Height up to 1 meter.

Anemone japonica Sieb. & Zucc. var. *tomentosa* Maxim. Fl. Tangut. 1: 7. 1889.

First described from Piasetzki's and Potanin's Kansu and Shensi collections.

Yao Chieh, No. 293. On a moist, clay roadside.

Height 1 meter; flowers 6 cm. in diameter, purplish.

Anemone narcissifolia L. Sp. Pl. 542. 1753.

First described from Europe and Siberia.

Ha La Hu Kou, Nos. 57, 58. On shaded, moist, rocky slopes with roots in crevices. Rare.

Flowers white or very slightly tinted outside with violet.

Anemone rivularis Buch.-Ham. in DC. Reg. Veg. Syst. 1: 211. 1818.

First described from Nepal.

Lien Ch'eng, No. 287; T'u Er P'ing, No. 397; Hsi Mi Yai, No. 493. Along irrigation ditches and on steppes and moist slopes. Common.

Height up to 60 cm.; flowers white.

Anemone aff. *rupestris* Wall. List No. 4696. 1831 (*nomen nudum*); Hook. f. & Thoms. Fl. Ind. 1: 21. 1855.

First described from alpine Himalaya.

La Ch'iung Kou, No. 605. On an exposed, moist, grassy slope. Rare.

Height 20 cm.; flowers orange-yellow with a black stripe on the outside of the petals.

Aquilegia ecalcarata Maxim. Fl. Tangut. 1: 20. *pl. 8. fig. 12.* 1889 (= *Semiaquilegia simulatrix* Drumm. & Hutch.).

First described from Potanin's and Przhevalski's Kansu, Szechwan, and Tibet collections.

T'u Er P'ing, No. 436. In woods. Rare, only one specimen found.

Height 45 cm.; flowers purple.

Aquilegia viridiflora Pall. Act. Acad. Sci. Petrop. 1779²: 260. *pl. 11.* 1783.

First described from Dahuria.

Ha La Hu Kou, No. 61. Along a stream in the shade of willows and often on exposed gravelly bottoms. Fairly common.

Height 30 cm.; flowers purplish green, nodding.

Aquilegia sp.

Shui Mo Kou, near Lien Ch'eng, No. 331. Scattered throughout woods. Common.

Flowers purple.

Batrachium flavidum Hand.-Mazz. Medd. Bot. Trädg. Göteborg 13: 168. 1940.

First described from Szechwan, Kansu, and Kashmir.

Chung Wei, No. 228. In a pond.

Stem up to 1.5 meters long; flowers pale yellow.

Caltha scaposa Hook. f. & Thoms. Fl. Ind. 1: 40. 1855.

First described from Sikkim.

Ch'ia Ch'ing Kou, Nos. 852, 859. Rare in wet rich woods or common in pure stands in deep, muddy, water-covered soil on steppes.

Height 5 to 20 cm.; stems square; flowers lemon-yellow; fruits brown.

Cimicifuga foetida L. var. *typica* Regel, Bull. Soc. Nat. Moscou 34²: 123. 1861.

First described from eastern Siberia.

La Chi Tzu Shan, No. 711. On the exposed, moist, gravelly bottom of a gorge. Common.

Height 1.8 meters; flowers yellowish, very fragrant.

Clematis aethusifolia Turcz. Bull. Soc. Nat. Moscou 5: 181. 1832.

First described from Mongolia.

Hsi Yeh Kou, No. 173; Ho Lan Shan, Nos. 1078, 1155. Climbing on bushes on dry, exposed, rocky or clay foothills or prostrate covering large areas. Common.

Length up to 4.5 meters; flowers greenish yellow or white.

Clematis alpina Mill. Gard. Dict. ed. 8, No. 9. 1768.

First described from Europe.

Nan Ssu Kou, Nos. 144, 158. Along partially shaded roadsides or on foothills. Common.

A climbing herb, 6 meters long; flowers abundant, large, double, creamy white or pink, fragrant.

Clematis brevipaudata DC. Reg. Veg. Syst. 1: 138. 1818.

First described from between Peking and Jehol.

Ho Lan Shan, No. 1074. In woods, climbing on shrubs. Common.

Length up to 6 meters; stems purplish; flowers yellowish, fragrant.

Clematis glauca Willd. var. **akebioides** (Maxim.) Rehd. & Wils. in Sarg. Pl. Wils. 1: 342. 1913.

First described from Piasetski's Kansu collections.

Labrang, No. 775. In woods, climbing on shrubs. Fairly common.

Length up to 3 meters; flowers brownish purple.

Clematis grata Wall. Pl. Asiat. Rar. 1: 83. pl. 98. 1830.

First described from Himalaya, China, and Africa.

Hsi Mi Yai, No. 478; Malisoondo, No. 883. On wooded as well as exposed, moist slopes. Common.

A climbing shrub, up to 6 meters long.

Clematis macropetala (Ledeb.) Ledeb. Icon. Pl. Ross. 1: 5. pl. 11. 1829.

First described from Dahuria.

Nan Ssu Kou, No. 142. Climbing on partially shaded, roadside bushes. Rare.

Length 6 meters; flowers large, double, purple.

Clematis nannophylla Maxim. Bull. Acad. Sci. St. Pétersb. 23: 305. 1877 (Mél. Biol. Acad. Sci. St. Petersb. 9: 707. 1877).

First described from Przhevalski's Kansu collections

Yao Chieh, No. 241. On a dry, exposed, bare, clay slope. Common.

Height 30 to 60 cm.; flowers dirty yellow.

Clematis tangutica Korsh., Bull. Acad. Sci. St. Pétersb. V. 9: 399. 1898.

First described from Przhevalski's Tibet and Mongolia collections.

Lien Ch'eng, Nos. 286, 318. Along bare, dry roadsides and moist stream banks. Common.

A procumbent or climbing herb, up to 6 meters long; flowers purplish or dull yellow.

Delphinium grandiflorum L. Sp. Pl. 531. 1753, vel aff.

First described from Siberia.

Shih Men, No. 922; Ho Lan Shan, No. 1070. On steppes and in woods. Very common.

Up to 60 cm. high; flowers purplish blue, yellow inside.

Delphinium henryi Franch. Compt. Rend. Soc. Philom. 1893¹³: 8. 1893.

First described from Hupeh.

T'ai Hua, No. 534. In a moist, exposed ravine. Rare.

Height 45 cm.; flowers deep purple.

Delphinium labrangense Ulbrich.²²

Ta P'an Shan, No. 657. On an exposed, moist slope. Very common.

Height up to 60 cm.; flowers purplish blue.

Delphinium tanguticum (Maxim.) Huth, Bull. Herb. Boiss. 1: 331. pl. 15. 1893.

First described from western Szechwan.

Ta P'an Shan, No. 657a.

Delphinium tongolense Franch. Bull. Soc. Philom. Paris VIII. 5: 166. 1893.

First described from Szechwan.

Upper Ch'ia Ch'ing Kou, No. 849. In partially shaded woods. Common, gregarious.

Height up to 1 meter; flowers purplish blue, the anthers black.

Delphinium spp.

1. Upper Ch'ia Ch'ing Kou, No. 861. On ridge and steppe. Common.

Height up to 45 cm.; flowers purplish green.

2. Ho Lan Shan, No. 1123. On steppes. Common.

Height 30 cm.; flowers deep purplish blue.

Leptopyrum fumarioides (L.) Reichenb. Consp. Veg. 192. 1828 (= *Isopyrum fumarioides* L.).

First described from Siberia.

Liu Fu Yai, No. 464. On moist, exposed slope. Common.

Height 30 cm.; flowers greenish yellow.

Oxygraphis glacialis (Fisch.) Bunge, Mém. Acad. Sci. St. Pétersb. 2: 557. 1835.^{22a}

First described from Siberia.

Ta P'an Shan, No. 654. On exposed, moist, grassy slopes. Rare.

Height 10 cm.; flowers yellowish green.

Paeonia anomala L. Mant. Pl. 2: 247. 1771.

First described from Siberia.

Hsi Mi Yai, No. 492; T'ai Hua, No. 546. On exposed, clay banks and in woods. Common.

Height up to 1 meter; flowers deep red, fragrant.

Paraquilegia anemonoides (Willd.) Ulbrich, Notizbl. Bot. Gart. Berlin 9: 209. 1925.

First described from the Altai Mountains.

Ta P'an Shan, No. 663; Upper Ch'ia Ch'ing Kou, No. 865; A Ch'uan, No. 973. In tussocks, on partially shaded, rocky cliffs. Common.

Height up to 38 cm.; flowers purplish or bluish; fruit brownish green.

Ranunculus affinis R. Br. in Parry, Journ. Voy. Disc. N.-W. Pass. Append. 265. 1821.

First described from Arctic America.

Ta P'an Shan, No. 644. In pure stands. Common.

Height up to 40 cm.

²² This specimen appears to be the same as *Rock 14482, 14483, 14504, and 14505*, all except the last determined by E. Ulbrich and cited as *Delphinium labragense* Ulbrich "ined." (Journ. Arn. Arb. 14: 11. 1933). However, this name seems still to be unpublished. Attempts to clarify this uncertainty have been unsuccessful because of the war.

^{22a} Dr. Lyman Benson has determined Ching's specimen as *Ranunculus kamchaticus* DC. He has referred *Oxygraphis* Bunge to a subgenus of *Ranunculus* (Amer. Journ. Bot. 27: 806. 1940) and in a letter to the writer has placed *O. glacialis* (Fisch.) Bunge as a synonym of *R. kamchaticus* DC.

Ranunculus affinis var. **capillaceus** Franch. Pl. Delav. 1: 19. 1889.

First described from Yunnan.

T'u Er P'ing, No. 413; Hsi Mi Yai, No. 498. At edge of woods. Common.
Height up to 45 cm.

Ranunculus arcuans Chien, Rhodora 18: 190. 1916, vel aff.

First described from Hupeh and Fukien.

Yao Chieh, No. 293. On a moist, cultivated field and along irrigation ditches.
Common.

Height 50 cm.

Ranunculus hirtellus Royle, Illustr. Bot. Himal. 1: 53. 1839.

First described from India.

Ta P'an Shan, No. 653. On exposed, moist, grassy slopes. Common.

Height up to 20 cm.

Ranunculus plantaginifolius Murr. Nov. Comm. Soc. Sci. Göttingen 7: 39.
pl. 2. 1777.

First described from Siberia.

Chung Wei, No. 216; Ho Lan Shan, No. 1118. On alkaline soil or in swampy
places. Common.

Height 18 cm.; flowers deep lemon-yellow.

Ranunculus pulchellus C. A. Meyer, in Ledeb. Fl. Alt. 2: 333. 1830; Icon. Pl.
Ross. 2: 8. pl. 111. 1830.

First described from the Altai Mountains.

Ha La Hu Kou, No. 63; Shui Mo Kou, Ho Lan Shan, No. 94. Along an ex-
posed, rocky roadside in a moist valley bottom. Rare.

Height 25 cm.

Ranunculus sp.

Wang Te Lin Kou, No. 81. Among grasses. Fairly common.

Height 25 cm.; flowers bright yellow.

Thalictrum baicalense Turcz. Bull. Soc. Nat. Moscou 11: 85. 1838 (*nomen
nudum*); 15: 29. 1842 (Fl. Baical. 1: 29. 1842).

First described from the Baikal region.

Shui Mo Kou, near Lien Ch'eng, No. 360. On a bushy slope.

Height 1 meter.

Thalictrum javanicum Blume, Bijdr. Fl. Nederl. Ind. 1: 2. 1825.

First described from Java.

Shui Mo Kou, near Lien Ch'eng, No. 333. On grassy slopes.

Height 1 meter; flowers white.

Thalictrum petaloideum L. Sp. Pl. ed. 2, 771. 1762.

First described from Siberia.

Liu Fu Yai, No. 468. Dotting moist grasslands and along roadsides. Common.

Height up to 60 cm.; flowers snow white.

?**Thalictrum przewalskii** Maxim. Bull. Acad. Sci. St. Pétersb. 23: 305. 1877
(Mél. Biol. Acad. Sci. St. Pétersb. 9: 707. 1877).

First described from Przhevalski's Kansu collections.

Lower Tu I Kou, No. 956. On fairly moist roadsides. Common.

Height 1 meter; fruit brown.

Thalictrum simplex L. Mant. Pl. 1: 78. 1767.

First described from Sweden.

Yao Chieh, No. 282. On moist clay roadsides.

Height 1 meter; flowers greenish yellow.

Thalictrum simplex var. **affine** (Ledeb.) Regel, Bull. Soc. Nat. Moscou 34¹: 57. 1861.

First described from western Siberia.

Lien Ch'eng, No. 278. On a moist roadside.

Height 1.2 meters; flowers greenish yellow.

Thalictrum spp.

1. Shui Mo Kou, near Lien Ch'eng, No. 333a.. On grassy slopes.

Height about 1 meter; flowers white.

2. Cho Ni, No. 1003. In woods. Common.

Height up to 1.2 meters; fruit brownish green.

3. Ho Lan Shan, No. 1089. On bushy and quite wooded slopes. Common.

Height up to 75 cm.; flowers greenish yellow, fragrant.

Trollius pumilus D. Don, Prodr. Fl. Nepal. 195. 1825.

First described from Nepal.

T'u Er P'ing, No. 394; La Ch'ung Kou, No. 610; Ta P'an Shan, No. 651.

In dense tussocks scattered on wet grassland. Common.

Height 45 cm.; flowers lemon-yellow to greenish purple.

BERBERIDACEAE

Berberis boschanii C. Schneid. in Sarg. Pl. Wils. 1: 369. 1913.

First described from western Szechwan.

Shui Mo Kou, Ho Lan Shan, No. 86; near Labrang, No. 773. In compact groups forming impenetrable thickets beside streams and on exposed, hard, clay slopes. Very common.

A shrub, up to 4 meters high; flowers yellow; fruits red.

Berberis brachypoda Maxim. Bull. Acad. Sci. St. Pétersb. 23: 308. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 9: 711. 1877).

First described from Piasetski's Kansu collections.

Wa P'ing Hsiang, No. 1029. On an exposed, fairly moist, clay slope. Common.

A shrub, up to 2 meters high; leaves distinctly reticulate; fruits red.

Berberis diaphana Maxim. Bull. Acad. Sci. St. Pétersb. 23: 309. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 9: 712. 1877).

First described from Przhevalski's Kansu collections.

T'u Er P'ing, No. 432. On exposed clay ridges. Rare. T'ai Hua, No. 556.

On an exposed moist slope. Very common. Lower Tu I Kou, No. 961. Fairly common.

A dense thorny shrub, up to 2 meters high; flowers yellow; berries purplish red.

Berberis kansuensis C. Schneid. Oesterr. Bot. Zeitschr. 67: 288. 1918.

First described from Purdom's Kansu collections.

Shui Mo Kou, near Lien Ch'eng, No. 342. At edge of forest.

A shrub, 3 meters high.

Berberis parvifolia Sprague, Kew Bull. Misc. Inf. 1908: 445. 1908.

First described from "western China."

Ch'ia Ch'ing Kou, No. 845. On upper parts of dry, exposed, clay foothills. Common.

A dense, dwarf shrub, up to 60 cm. high; fruit reddish.

Berberis purdomii C. Schneid. in Sarg. Pl. Wils. 1: 372. 1913.

First described from Shensi.

Hsi Yeh Kou, No. 167. In a gorge along a dry, rocky roadside. Common.

A shrub, up to 4 meters high; flowers yellow, fragrant.

Berberis verna C. Schneid. in Sarg. Pl. Wils. 1: 372. 1913.

First described from Purdom's Kansu collections from Min Chou.

Lang Tzu T'ang Kou, No. 599; Labrang, No. 770; Cho Ni, No. 1001; Lien Hua Shan, No. 1036. In woods, on exposed river banks, and on exposed moist foothills. Common.

A dense, thorny shrub, forming dense thickets up to 4.5 meters high; flowers lemon-yellow; fruits deep red.

Epimedium sagittatum (Sieb. & Zucc.) Baker, Gard. Chron. n. ser. 13: 683. 1880.

First described from Japan.

Ch'ia Ch'ing Kou, No. 941. In a *Populus* forest. Common.

Height 54 cm.

Podophyllum emodi Wall. List No. 814. 1829 (*nomen nudum*); Hook. f. & Thoms. Fl. Ind. 1: 232. 1855.

First described from Himalaya.

T'u Er P'ing, No. 379. In woods.

Height 75 cm.

PAPAVERACEAE

Hypecoum leptocarpum Hook. f. & Thoms. Fl. Ind. 1: 276. 1855.

First described from western Tibet and Sikkim.

Liu Fu Yai, No. 470. Creeping over moist soil. Common.

Flowers purplish.

Meconopsis horridula Hook. f. & Thoms. var. **racemosa** (Maxim.) Prain, Journ. Asiat. Soc. Bengal 64²: 313. 1896.

First described from Przhevalski's Kansu collections.

Ta P'an Shan, No. 655. On exposed, moist, alpine summits. Common.

Height up to 45 cm.; flowers deep blue.

Meconopsis integrifolia (Maxim.) Franch. Bull. Soc. Bot. France 33: 389. 1886.

First described from Przhevalski's Kansu collections.

T'ai Hua, No. 555. On moist, exposed slopes. Common.

Height up to 1.2 meters.

Meconopsis punicea Maxim. Fl. Tangut. 1: 34. 1889.

First described from Przhevalski's northeastern Tibet and Szechwan collections.

T'ai Hua, No. 519; Yeh Ts'ang Kou, No. 818. On moist exposed slopes. Common.

Height up to 75 cm.; flowers purple to deep red, the anthers yellow, the filaments red; calyx deciduous, armed with brown hairs.

Papaver nudicaule L. Sp. Pl. 507. 1753.

First described from Siberia.

La Chi Tzu Shan, No. 699. On exposed, moist steppes.

Height up to 45 cm.; flowers yellow; calyx armed with purple spines.

FUMARIACEAE

Corydalis adunca Maxim. Bull. Acad. Sci. St. Pétersb. 24: 29. 1878 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 47. 1878).

First described from Przhevalski's Kansu collections.

Nan Ssu Kou, No. 150. On an exposed, dry, rocky cliff. Common.

Flowers yellow.

- Corydalis albicaulis** Franch. Nouv. Arch. Mus. Hist. Nat. (Paris) II. 5: 182. *pl.* 8. 1883 (Pl. David. 1: 30. *pl.* 8. 1884).
First described from David's Mongolian collections.
Lanchow, No. 239. On an exposed, bare, clay cliff.
Flowers yellow.
- Corydalis chingii** Fedde, Repert. Sp. Nov. Fedde 22: 219. 1926.
Liu Fu Yai, No. 461 (type). In a moist place at foot of a rocky cliff. Rare.
Height 60 cm.; flowers purplish.
- Corydalis dasyptera** Maxim. Bull. Acad. Sci. St. Pétersb. 24: 28. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 45. 1878).
First described from Przhevalski's Kansu collections.
La Chi Tzu Shan, No. 703. On partially shaded, very moist steppes. Common.
Flowers yellow.
- Corydalis hannaë** Kanitz in Széchenyi, Keletaz Utjánk 2: 795. 1891 (Pl. Exped. Szech. Asia Centr. 7. 1891).
First described from Loczy's Kansu collections.
Ta P'an Shan, No. 658. In dense patches on exposed, moist, bare slopes and along roadsides. Very common.
Lips deep purple, the remainder of the corolla greenish purple.
- Corydalis impatiens** (Pall.) Fisch. in DC. Reg. Veg. Syst. 2: 124. 1821.
First described from Siberia.
Lang Tzu T'ang Kou, No. 589. In large tufts in shade at foot of rocky cliffs. Common.
Stem triangular, tender, hollow; flowers greenish yellow.
- Corydalis kansuana** Fedde, Repert. Sp. Nov. Fedde 22: 221. 1926.
Lien Hua Shan, No. 1025 (type). On an exposed, moist, clay bank. Common.
Flowers purple with white lips.
- Corydalis linarioides** Maxim. Bull. Acad. Sci. St. Pétersb. 24: 27. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 44. 1878).
First described from Przhevalski's Kansu collections.
T'ai Hua, No. 545. On shady edges of forests. Common.
Flowers yellow, the lips brownish.
- Corydalis pauciflora** Pers. var. *holanschanica* Fedde, Repert. Sp. Nov. Fedde 22: 221. 1926.
Hua Hsi Kou, No. 79. Found only at 2,830 meters altitude, under grass beside the trail. Flowers violet-colored. Ho Lan Shan, No. 1150 (type).
On exposed moist humus. Common.
Flowers bluish.
- Corydalis rosea** Maxim. Bull. Acad. Sci. St. Pétersb. 24: 28. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 46. 1878).
First described from Przhevalski's Kansu collections.
Hsi Mi Yai, No. 494. On a dry, exposed, clay slope. Common.
Flowers purplish.
- Corydalis scaphopetala** Fedde, Repert. Sp. Nov. Fedde 22: 220. 1926.
Ch'ia Ch'ing Kou, No. 843 (type). On the shady edges of woods. Common.
Flowers greenish yellow.

Corydalis sp.

A Chüan, No. 970.²³ In *Abies* forest at foot of a bare rocky ridge. Fairly common.

Height up to 50 cm.

CRUCIFERAE

Arabis (?) *alaschanica* Maxim. Bull. Acad. Sci. St. Pétersb. 26: 421. 1880 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 568. 1880).

First described from Przhevalski's Alashan, Mongolia collections.

Ha La Hu Kou, No. 65; Ho Lan Shan, No. 1061. On shaded, moist, gravelly valley bottoms, rarely in exposed places.

Flowers purplish white, fragrant.

Arabis *hirsuta* (L.) Scop. Fl. Carn. ed. 2, 2: 30. 1772.

First described from Europe.

Lang Tzu Tang Kou, No. 588. Beside a stream, at the foot of a cliff. Common.

Flowers white.

Arabis *pendula* L. Sp. Pl. 665. 1753.

First described from Siberia.

Upper Ch'ia Ch'ing Kou, No. 855a; Ho Lan Shan, No. 1082. At edge of woods.

Flowers white.

Brassica *junceae* (L.) Czern. & Coss. Bull. Soc. Bot. France 6: 609. 1859.

First described from Europe.

Lien Ch'eng, No. 289. On margins of cultivated fields.

Flowers yellow.

Capsella *bursa-pastoris* (L.) Moench. Meth. Pl. 271. 1794.

First described from Europe.

Yao Chieh, No. 292. On moist roadsides.

Flowers white.

Cardamine *macrophylla* Willd. Sp. Pl. 3: 484. 1800.

First described from Siberia.

T'u Er P'ing, No. 437. In woods. Rare.

Flowers purple.

Cardamine *tangutorum* O. E. Schulz, Bot. Jahrb. Engler 32: 360. 1903.

First described from central and northern China.

Ta P'an Shan, No. 673. On exposed, moist slopes. Common.

Height 45 cm.; flowers purplish.

Descurainia *sophia* (L.) Webb. forma *hygrophila* (Fourn.) O. E. Schulz, in Engl. Pflanzenreich 86 (IV. 105): 313. 1924.

First described from France.

La Ch'iong Kou, No. 619. On exposed, moist foothills and on summits, in association with *Thlaspi arvense* L. Common.

Flowers yellow, fragrant.

Dilophia *fontana* Maxim. Bull. Acad. Sci. St. Pétersb. 26: 423. 1880 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 570. 1880).

First described from Przhevalski's Kansu collections.

La Ch'iong Kou, No. 636. In a tuft on exposed, wet beaches. Common.

Petals white.

²³ This is apparently identical with *J. F. Rock* 12834, collected in July 1925 on mossy slopes in the "valley of Shiaoku, beyond Adjuan [= A Chüan], Tao River basin," reported to have pale yellow flowers. The identity of this specimen is not reported by Rehder and Kobuski (24).

Draba eriopoda Turcz. Bull. Soc. Nat. Moscou 15¹: 260. 1842 (Fl. Baical. 1: 42. 1842).

First described from Lake Kossogol and Dahuria.

Hsi Mi Yai, No. 495 (a large form). Rare, only one plant found, in woods. Lang Tzu T'ang Kou, No. 591. Along a stream, at the foot of a cliff. Common. Flowers yellow or greenish yellow.

Draba lanceolata Royle var. *chingii* O. E. Schulz in Engl. Pflanzenreich 89 (IV. 105): 298. 1927.

Hsi Mi Yai, No. 497 (type). At sandy edges of woods. Common. Flowers white.

Draba lanceolata var. *leiocarpa* O. E. Schulz in Engl. Pflanzenreich 89 (IV. 105): 297. 1927.

First described from Mongolia, Turkestan, and Himalaya.

Ho Lan Shan, No. 1047. On exposed, rocky slopes. Common. Flowers white.

Draba nemorosa L. Sp. Pl. 643. 1753.

First described from Sweden.

Pei Ssu Kou, No. 117. On shaded, moist, rich soil in pine forests. Rare.

Ho Lan Shan, No. 1112. On grassy foothills.

Flowers greenish yellow.

Eruca sativa Mill. var. *lativalvis* subvar. *eriocarpa* (Boiss.) Post, Notizbl. Bot. Gart. Berlin 12: 212. 1934.

First described from "Hopkinson's" (Hao Kin-shen's) Min Chou, Kansu, collections.

Lien Ch'eng, No. 316. In a cultivated field.

Flowers lemon-yellow.

Eutrema compactum O. E. Schulz, Repert. Sp. Nov. Fedde Beih. 12: 387. 1922.

First described from Turkestan, northern Mongolia, northern China, and Tibet.

Ta P'an Shan, No. 649. On an exposed, moist, grassy slope. Rare.

Height 30 cm.

Lepidium apetalum Willd. Sp. Pl. 3: 439. 1800.

First described from Siberia.

Chung Wei, No. 220; Ni Ma Lang Kou, No. 750. In a moist field of alkaline soil and on exposed steppes. Common.

Lepidium latifolium (L.) subsp. *sibiricum* (Schweigger) Thell. Nouv. Mém. Soc. Helvet. Sci. Nat. 41¹: 161. 1906.

First described from Siberia.

Hsin Ch'eng, near Ningsia, No. 210; Yao Chieh, No. 272. In cultivated fields of clay soil. Common.

Flowers white, fragrant.

Malcolmia africana (L.) R. Br. in Ait. Hort. Kew, ed. 2, 4: 121. 1812.

First described from Ethiopia.

Hsi Mi Yai, No. 502. On the margin of a stream.

Nasturtium palustre (Leyss.) DC. Reg. Veg. Syst. 2: 191. 1821.

First described from Sweden.

Yao Chieh, No. 290. On edges of cultivated fields.

Flowers greenish yellow.

Raphanus sativus L. Sp. Pl. 669. 1753.

First described without locality.

Ho Lan Shan, No. 1141. Cultivated.

Flowers pink.

Thlaspi arvense L. Sp. Pl. 646. 1753.

First described from Europe.

La Ch'iung Kou, No. 618; Ho Lan Shan, No. 1108. In dense patches on exposed, moist, grassy valley bottoms and hills. Common.

Flowers white, fragrant. The foliage is edible.

Torularia humilis (C. A. Meyer) O. E. Schulz forma *hygrophila* (Fourn.) O. E. Schulz in Engl. Pflanzenreich 86 (IV. 105): 225. 1924.

First described from Siberia.

Shui Mo Kou, Ho Lan Shan, No. 99. In rich soil along shaded roadsides. Rare.

Flowers white.

Torularia humilis prol. *piasezkii* (Maxim.) O. E. Schulz in Engl. Pflanzenreich 86 (IV. 105): 226. 1924.

First described from Piasetski's Kansu and Mongolia collections.

T'u Er P'ing, No. 373. On grasslands.

Flowers white.

CRASSULACEAE

Sedum aizoon L. forma *angustifolia* Franch. Nouv. Arch. Mus. Hist. Nat. (Paris) II. 6: 9. 1883 (Pl. David. 1: 129. 1884).

First described from Peking.

Yao Chieh, No. 266. On a shaded clay cliff. Sparsely scattered. Ningsia, No. 1076. In woods and along moist roadsides

Height 25 cm.; flowers greenish yellow; leaves purplish.

Sedum crassipes (Wall.) Hook. f. & Thoms. Journ. Linn. Soc. Bot. 2: 99. 1858.

First described from Himalaya and northern India.

Ta P'an Shan, No. 661. In a large patch on the exposed gravelly margin of a stream. Common.

Height up to 38 cm.; fruits and stems red.

Sedum dumulosum Franch. Nouv. Arch. Mus. Hist. Nat. (Paris) II. 6: 9. 1883 (Pl. David. 1: 129. 1884).

First described from Hopeh.

Ta P'an Shan, No. 642; Ho Lan Shan, No. 1144. In drooping tufts in crevices of a moist, shady cliff. Common.

Height up to 30 cm.; flowers creamy white; anthers deep purple.

Sedum elatinoides Franch. Nouv. Arch. Mus. Hist. Nat. (Paris) II. 6: 11. pl. 16. 1883 (Pl. David. 1: 131. pl. 16. 1884), vel aff.

First described from Shensi.

Lang Tzu T'ang Kou, No. 579. On an exposed, moist, gravelly stream bank. Common.

Height 8 cm.; flowers yellow.

Sedum fimbriatum (Turez.) Franch. Nouv. Arch. Mus. Hist. Nat. (Paris) II. 6: 8. 1883 (Pl. David. 1: 128. 1884).

First described from Dahuria.

Ni Ma Lang Kou, No. 767. On an exposed, dry, rocky cliff. Rare.

Height up to 30 cm.; flowers purplish.

Sedum quadrifidum Pall. var. *fastigiatum* (Hook. f. & Thoms.) Fröderst. Medd. Bot. Trädg. Göteborg 5, Append.: 30. pl. 6, 7. fig. 61-67. 1930.

First described from Sikkim, India.

La Chi Tzu Shan, No. 696. Forming an umbrella-like tuft on an exposed, moist, limestone cliff. Common.

Height 10 cm.; fruit red.

Sedum roseum (L.) Scop. Fl. Carn. ed. 2, 1: 326. 1772.

First described from Europe.

Ta P'an Shan, No. 664. In a dense tussock on a partially shaded, rocky cliff. Common.

Height 45 cm.; flowers yellowish brown.

Sedum telephium L. subsp. *angustum* (Maxim.) Fröderst. Medd. Bot. Trädg. Göteborg 5, Append.: 64. pl. 24. 1930.

First described from Przhevalski's Kansu collections from the Ta T'ung Valley.

"Kwa Shan," No. 1041. On an exposed, dry, bare, clay slope. Rare.

Height up to 90 cm.; fruit brownish.

Sedum sp.

T'ai Hua, No. 550. In woods. Common.

Height 45 cm.; flowers yellow.

SAXIFRAGACEAE

Chrysosplenium axillare Maxim. Bull. Acad. Sci. St. Pétersb. 23: 341. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 9: 758. 1877).

First described from Przhevalski's Kansu collections.

La Ch'iung Kou, No. 641. On a densely shaded, rocky cliff beside a stream. Common.

Flowers yellowish.

Chrysosplenium chingii Hara, sp. nov. (Oppositifolia-Nepalensia).

Herba glaberrima. Caulis erectus 6–12 cm. altus. Innovationes epigaei ascendentes foliati. Folia radicalia parva rotundato-ovata usque ad 1 cm. longa apice rotundata basi late cuneata margine utrinque 5–6–obtusoserrata 7–12 mm. longa 6–10 mm. lata herbacea, petiolis 5–10 mm. longis; folia innovationis caulinis conformia. Inflorescentia compacta involucrata 2–3 cm. in diametro. Folia involucralia inferiora caulinis similia brevius petiolata, superiora parva saepe paullo angustiora basi oblique cuneata lutescentia. Flores brevissime pedicellati. Sepala depresso semicirculata ca. 1.5 mm. longa 1.5–2 mm. lata luteo-viridescens. Stamina vulgo 8, filamentis subulatis circa 0.7 mm. longis, antheris luteis. Ovarium semi-inferius. Fructus immaturi circa 4 mm. longi semi-inferiores, rostris ovatis suberectis inaequalibus apice stylo circa 0.5 mm. erecto-patente coronatis. Semina immatura sublaevia.

Type in the United States National Herbarium, No. 1245628, collected by R. C. Ching, No. 601, at La Ch'iung Kou, near Sining, 3,200 meters altitude, July 24, 1923.

A *C. chamaedryoides* Engler rostris capsulae brevioribus obtusioribus, et a *C. quebriantiano* Hand.-Mazz. innovationis epigaeis, foliis margine non incrassatis, staminibus 8, capsulis majoribus semi-inferioribus differt.

Chrysosplenium griffithii Hook. f. & Thoms. Journ. Linn. Soc. 2: 74. 1858.

First described from eastern temperate Himalaya.

Lung Hua, No. 809. In rocky crevices in a forest. Fairly common.

Height 20 cm.; flowers yellowish green.

Chrysosplenium nudicaule Bunge, in Ledeb. Fl. Alt. 2: 114. 1830.

First described from the Altai Mountains.

Ta P'an Shan, No. 665. On a partially shaded, rocky cliff.

Flowers greenish, the anthers bright yellow.

Hydrangea bretschneideri Dippel, Handb. Laubh. 3: 320. 1893.

First described from northern China and Mongolia.

Shui Mo Kou, near Lien Ch'eng, No. 336; Ch'ia Ch'ing Kou, No. 835.

In woods, mixed with *Sorbaria*, *Acer*, and *Philadelphus*. Common.

Bracts white.

Parnassia laxmanni Pall. in Roem. & Schult. Syst. Veg. 6: 696. 1820.

First described from Kamchatka.

Ch'ing Kang Yai, No. 565. At the foot of a shaded cliff. Very rare.

Flowers white.

Parnassia trinervis Drude var. **viridiflora** (Batalin) Hand.-Mazz. Symb. Sin. 7: 432. 1931.

First described from Potanin's and Przhevalski's Kansu collections.

Ni Ma Lang Kou, No. 745. On exposed, moist steppes. Common.

Flowers yellowish green, fragrant.

Philadelphus pekinensis Rupr. var. **kansuensis** Rehd. Journ. Arn. Arb. 9: 49. 1928.

First described from Rock's Kansu collections.

Shui Mo Kou, near Lien Ch'eng, No. 325; T'u Er P'ing, No. 393; Tai Wang Kou, No. 440; Hsi Mi Yai, No. 484. One of the commonest flowering shrubs in woods and on bushy slopes.

Height up to 6 meters; flowers snow white, fragrant.

Saxifraga atrata Engl. in Maxim. Bull. Acad. Sci. St. Pétersb. 29: 117. 1883 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 718. 1883).

First described from Przhevalski's Kansu collections.

La Ch'iong Kou, No. 611. On exposed, moist, grassy slopes. Rare.

Petals white, the disk deep purple.

Saxifraga egregia Engl. in Maxim. op. cit. p. 114 (p. 712).

First described from Przhevalski's Kansu collections.

Ni Ma Lang Kou, No. 768. Rare. Lung Hua, No. 814. In woods. Common.

Flowers yellow, the inner face of the petals dotted with orange spots.

Saxifraga giraldiana Engl. var. **biondiana** Engl. Bot. Jahrb. Engler 29: 366 1901.

First described from Shensi (?).

Ch'ia Ch'ing Kou, No. 947. In woods. Common.

Flowers lemon-yellow.

Saxifraga montana H. Smith, Medd. Bot. Trädg. Göteborg 1: 9. 1924.

First described from northern Szechwan.

La Ch'iong Kou, No. 633. On a densely shaded, rocky cliff beside a stream. Rare.

Flowers orange-yellow, the lower half of the petals dotted with many bright yellow spots.

Saxifraga pseudohirculus Engl. Bot. Jahrb. Engler 48: 590. 1912.

First described from Przhevalski's Kansu collections as *S. hirculoides* Engl. (not Decaisne).

La Ch'iong Kou, No. 622. On a moist, partially shaded slope. Rare.

Upper Ch'ia Ch'ing Kou, No. 869. In tussocks in woods. Common.

Flowers orange-yellow.

Saxifraga tangutica Engl. var. **minutiflora** Engl. in Maxim. Bull. Acad. Sci. St. Pétersb. 29: 114. 1883 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 714. 1883).

First described from Przhevalski's Kansu collections.

T'u Er P'ing, No. 419. In woods. Common.

Flowers brownish yellow.

GROSSULARIACEAE

Ribes emodense Rehd. var. **verruculosum** Rehd. Journ. Arn. Arb. 5: 162. 1924.

First described from Hopeh and Shansi.

Upper Shui Mo Kou, near Lien Ch'eng, No. 381; Upper Ch'ia Ch'ing Kou, No. 867; Ho Lan Shan, No. 1113. In open woods or exposed bushy slopes. Common.

A dense shrub, 2.5 meters high; flowers purplish; fruit deep purple, very acid but edible.

Ribes giraldii Jancz. Bull. Acad. Sci. Cracovie Sci. Math. Nat. 1906: 289. 1906 (Mém. Soc. Phys. Hist. Nat. Genève 35: 455. 1907).

First described from Shensi.

South of Lien Hua Shan, No. 1158. On a dry, exposed slope of hard clay. Common.

Fruit reddish yellow, slightly acid.

Ribes meyeri Maxim. Bull. Acad. Sci. St. Pétersb. 19: 260. 1874 (Mél. Biol. Acad. Sci. St. Pétersb. 9: 232. 1873).

First described from the Altai Mountains and Hopeh.

Upper Shui Mo Kou, near Lien Ch'eng, Nos. 377, 383. At the foot of a rocky cliff.

A low, much-branched shrub, up to 2 meters high.

Ribes pulchellum Turcz. Bull. Soc. Nat. Moscou 5: 191. 1832.

First described from Mongolia.

Shui Mo Kou, Ho Lan Shan, No. 91. On an exposed rocky ridge. Rare. Nan Ssu Kou, No. 141. On a dry, exposed, gravelly stream bank.

A shrub, up to 3 meters high; branches long, slender, pendent, thorny, shining brown and corky-ridged; fruits edible.

Ribes stenocarpum Maxim. Bull. Acad. Sci. St. Pétersb. 27: 475. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 228. 1881).

First described from Przhevalski's Kansu collections.

Upper Shui Mo Kou, near Lien Ch'eng, No. 392. At the foot of a rocky cliff. Common.

A shrub, about 1.2 meters high; flowers greenish white; fruits edible but somewhat acid.

ROSACEAE

Agrimonia eupatoria L. Sp. Pl. 448. 1753.

First described from Europe.

T'u Er P'ing, No. 400. On a bushy slope.

Flowers yellow.

Chamaerhodos erecta (L.) Bunge in Ledeb. Fl. Alt. 1: 430. 1829.

First described from Siberia.

Hsin Ch'eng, west of Lanchow, No. 308; Ho Lan Shan, No. 1087. On dry grasslands and clay slopes.

Height 30 cm.; flowers yellowish or white; fragrant.

Cotoneaster acutifolia Turcz. var. **villosula** Rehd. & Wils. in Sarg. Pl. Wils. 1: 158. 1912.

First described from Hupeh.

Ch'ien Kou, No. 1037. At edge of woods, associated with *Salix* and other species of *Cotoneaster*. Common.

Fruits black, hairy.

Cotoneaster adpressa Bois in Vilm. & Bois, Frutic. Vilm. Cat. Prim. 116. 1 fig. 1904.

First described from plants grown from seeds from China.

San Ta Lai Ssu, No. 728; Pa Yen Jung Kê, No. 740. Shih Men, No. 916. On exposed, grassy, moist or dry slopes. Common.

A dwarf shrub, about 60 cm. high; fruits deep red.

Cotoneaster ambigua Rehd. & Wils. in Sarg. Pl. Wils. 1: 159. 1912.

First described from western Szechwan.

In gorge of Malisoondo, No. 884; Upper Tu I Kou, No. 969. In dry places. Fairly common.

A dense shrub, up to 3 meters high; fruits red, stems brown.

Cotoneaster apiculata Rehd. & Wils. in Sarg. Pl. Wils. 1: 156. 1912, vel aff.

First described from western Szechwan.

Shih Men, No. 914. On bare, dry, limestone cliffs. Fairly common.

A shrub, 4 meters high; fruits purplish red, small.

Cotoneaster foveolata Rehd. & Wils. in Sarg. Pl. Wils. 1: 162. 1912.

First described from western Hupeh.

Shui Mo Kou, near Lien Ch'eng, No. 352; Ni Ma Lang Kou, No. 757; Ch'ien Kou, No. 1045. At edges of forests, in *Betula* woods, or along moist roadsides. Common.

A shrub, up to 2 meters high; fruits red.

Cotoneaster melanocarpa (Ledeb.) Loud. Hort. Brit. ed. 2, 585 (suppl. 1). 1832.

First described from the Altai Mountains.

Nan Ssu Kou, No. 147; Ch'ia Te Kou, No. 157. In exposed places on hills or along roadsides. Rare.

A very distinct low shrub, 1.2 meters high; flowers pink, fragrant.

Cotoneaster multiflora Bunge in Ledeb. Fl. Alt. 2: 220. 1830; Icon. Pl. Ross. 2: 22. pl. 274. 1831.

First described from the Altai Mountains.

Lien Ch'eng, No. 329; Lung Hua, No. 796. In open forests or along roadsides. Common.

A large shrub or small tree, the largest specimen found being up to 4 meters high, with a large crown spreading 4 meters from the trunk; fruit purplish red.

Cotoneaster multiflora var. **calocarpa** Rehd. & Wils. in Sarg. Pl. Wils. 1: 170. 1912.

First described from western Szechwan.

Ch'ia Ch'ing Kou, No. 827; Shih Men, No. 896; Cho Ni, No. 1004. On exposed slopes of hard clay. Common.

Fruits deep red.

Cotoneaster racemiflora K. Koch var. **soongorica** (Regel) C. Schneid. Handb. Laubh. 1: 754. 1906.

First described from Sungaria.

Pei Ssu Kou, No. 106; Nan Ssu Kou, No. 153; Shui Mo Kou, Ho Lan Shan, No. 168; Lien Ch'eng, No. 301. In dry rocky ravines or valley bottoms on exposed, moist stream banks. Common.

A shrub, 2 to 6 meters high; flowers creamy white, fragrant, abundant.

Cotoneaster tomentosa Lindl. Trans. Linn. Soc. 13: 101. 1822, vel. aff.

First described from southern Europe.

Ho Lan Shan, No. 201. On a dry, exposed, rocky slope. Common.

A shrub, 2.5 meters high, usually deformed by constant cutting for fuel; flowers pink.

Crataegus kansuensis E. H. Wils. Journ. Arn. Arb. 9: 58. 1928.

First described from Rock's collection from forests northwest of Cho Ni, Kansu.

Lanchow, No. 244. Possibly cultivated. Rare. Lien Ch'eng, No. 366; north side of Lien Hua Shan, No. 1017; Ch'ien Kou, No. 1030. In *Betula* woods, at edge of woods, or in moist open places. Common.

A shrub, up to 5 meters high; fruits deep red.

Fragaria vesca L. Sp. Pl. 494. 1753.

First described from northern Europe.

Shui Mo Kou, near Lien Ch'eng, No. 332. In woods. Common.

Fruit purplish red, acid, highly edible.

Geum strictum Ait. Hort. Kew. 2: 217. 1789.

First described from North America.

Yao Chieh, No. 300; T'u Er P'ing, No. 416; Ch'ing Kang Yai, No. 566. In woods or along streams. Common.

Height up to 60 cm.; flowers bright yellow.

Maddenia hypoxantha Koehne, in Sarg. Pl. Wils. 1: 57. 1912.

First described from western Szechwan.

Upper Shui Mo Kou, near Lien Ch'eng, No. 391. In woods. Common.

A shrub, up to 4 meters high; fruit purplish.

Malus baccata Borkh. Handb. Forstbot. 2: 1280. 1803.

First described from Dahuria.

Lien Hua Shan. No. 1038. At edges of woods on northern slopes, associated with *Salix* and *Crataegus*. Common.

A shrub, up to 9 meters high; fruit purplish red, highly acidic.

Malus kansuensis (Batalin) C. Schneid. Repert. Sp. Nov. Fedde 3: 178. 1906.

First described from Potanin's Szechwan and Henry's Hupeh collections.

Ch'ia Ch'ing Kou, No. 942; Ch'ien Kou, No. 1007. In woods, sometimes densely shaded. Common.

A shrub or small tree, up to 9 meters high; fruit purplish red, soft, highly acid, edible. The wood is hard, and is used for mule saddles.

Malus transitoria (Batalin) C. Schneid. Handb. Laubh. 1: 726. 1906.

First described from Potanin's and Przhevalski's Kansu collections.

Pei Ssu Kou, No. 120; Tai Wang Kou, No. 445. Rare. San Ta Lai Ssu, No. 724; Cho Ni, No. 997. Along exposed dry roadsides, on rocky slopes, and in ravines. Common.

A shrub or small tree, up to 8 meters high; fruit red or yellow, strongly astringent, edible. This species is highly ornamental in flower and in fruit.

Potentilla anserina L. Sp. Pl. 495. 1753.

First described from Europe.

Pei Ssu Kou, No. 123; Ho Lan Shan, No. 1120. Along margins of streams or in wet places. Common, gregarious.

Height up to 25 cm.; flowers lemon-yellow.

Potentilla bifurca L. Sp. Pl. 497. 1753.

First described from Siberia.

Wang Yeh Fu, No. 36; Nan Ssu Kou, No. 139; Ho Lan Shan, No. 1053. In patches on moist steppes. Common.

Height up to 15 cm.; flowers yellow.

Potentilla chinensis Seringe, in DC. Prodr. 2: 581. 1825.

First described from China.

Ha La Hu. Kou, No. 48; Hsi Yeh Kou, No. 170; Huang Hsi Kou, No. 196; Ho Lan Shan, Nos. 1055, 1088. On exposed, moist or dry slopes and along roadsides, sometimes among grasses. Common.

Height up to 45 cm.; plant very variable; flowers yellow, opening only in bright sunlight.

Potentilla fruticosa L. var. *parvifolia* (Fisch.) T. Wolf, *Bibl. Bot.* 16th: 58. 1908.

First described from Sungaria.

Yao Chieh, No. 265; Shui Mo Kou, near Lien Ch'eng, No. 376; T'u Er P'ing, No. 406; Ho Lan Shan, No. 1114. On exposed rocky and bushy or clay slopes and cliffs. One of the commonest shrubs (except at T'u Er P'ing).

A low, dense shrub, 75 cm. high; flowers bright yellow, fragrant. This variety is very resistant to drought.

Potentilla fruticosa var. *veitchii* (E. H. Wils.) Bean, *Trees & Shrubs Brit. Isl.* 2: 223. 1 fig. 1914.

First described from Hupeh.

Nan Ssu Kou, No. 154; Lien Ch'eng, No. 368; T'u Er P'ing, No. 435; Ho Lan Shan, No. 1146. On bare, exposed, bushy slopes or in woods. Common in northern and western Kansu.

A low, dense shrub, up to 1 meter high; flowers creamy white, abundant, fragrant.

Potentilla leschenaultiana Seringe in DC. *Prodr.* 2: 584. 1825.

First described from India.

Hsi Mi Yai, No. 501. Beside streams. Common.

Height 30 cm.; flowers bright yellow.

Potentilla salesoviana Steph. *Mém. Soc. Nat. Moscou* 2: 6. pl. 3. 1809.

First described from Siberia.

La Chi Tzu Shan, No. 714; Ho Lan Shan, No. 1134. On an exposed, moist, gravelly stream bottom, sometimes swampy. Common.

A dense shrub, up to 1.3 meters high; flowers white.

Potentilla subacaulis L. *Syst. Nat.* ed. 10, 1065. 1759.

First described without locality.

Chen Mu Kuan, No. 166. Along dry, exposed, clay roadsides. Common.

Height 10 cm.; flowers yellowish.

Potentilla viscosa Donn, *Hort. Cantabr.* ed. 2, 68. 1800 (*nomen nudum*); Ledeb.

Fl. Ross. 2: 41. 1844; *Icon. Pl. Ross.* 4: pl. 343. 1833.

First described from Siberia.

Hsi Mi Yai, No. 479. On clay banks along roadsides. Common.

Height up to 45 cm.; flowers bright yellow, fragrant.

Prinsepia uniflora Batalin, *Act. Hort. Petrop.* 12: 167. 1892.

First described from Potanin's Mongolia collections.

East of Hsin Ch'eng, south of Lanchow, No. 1033. Along exposed, dry, clay roadsides. Common.

A low, dense shrub, up to 2 meters high; fruit purplish red.

Prunus mongolica Maxim. *Bull. Soc. Nat. Moscou* 54: 16. 1879.

First described from Przhevalski's Mongolian collections.

Ha Ta Men River, No. 5; "Wu La Koo Do," Wu Yüan Hsien, No. 9; Hsi Yeh Kou, No. 161. On exposed southern slopes, often associated with *Zizyphus* and *Berberis*. Common in Inner Mongolia.

An early blossoming shrub, 1 to 3 meters high, the twigs thornlike; sepals red, petals pink, notched at tip; fruit small, densely pubescent, strongly acid, separating from the stone. The wood is hard and reddish brown and is valued for ax handles. The flowers make this species highly ornamental, Peking gardeners coming here for them every spring.

Prunus padus L. Sp. Pl. 473. 1753.

First described from Europe.

T'u Er P'ing, No. 378; Cho Ni, No. 1002. On wooded or bushy slopes. Common in southern Kansu.

A shrub, up to 8 meters high, sprouting freely from old stumps, the stems and leaves giving off a peculiar odor when broken; fruit deep purple or black. This species is very ornamental because of long strings of black fruits.

Prunus salicina Lindl. Trans. Hort. Soc. London 7: 239. 1830.

First described from southern China.

Ch'ia Ch'ing Kou, No. 832. On exposed and wooded foothills. Very common especially in the lower part of the valley.

A shrub or small tree, up to 8 meters high; fruit covered with bloom, astringent.

Prunus sibirica L. Sp. Pl. 474. 1753.

First described from Siberia.

Hsi Ch'iao Ssu, No. 730. On an exposed, moist stream bank. Common.

A small tree, up to 8 meters high; fruit red, acid, edible.

Prunus stipulacea Maxim. Bull. Acad. Sci. St. Pétersb. 29: 97. 1883 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 689. 1883).

First described from Przhevalski's Kansu collections in the Ta T'ung valley.

Shui Mo Kou, near Lien Ch'eng, No. 341; T'u Er P'ing, No. 405; Tai Wang Kou, No. 443. In woods. Common.

A shrub, up to 6 meters high; fruits purplish red, bitter.

Prunus tangutica (Batalin) Koehne, in Sarg. Pl. Wils. 1: 276. 1912.

First described from Potanin's Kansu collections from the T'ao Ho region.

Ch'ia Ch'ing Kou, No. 831. On exposed, dry, clay foothills along the river. Very common.

A dense shrub, up to 3 meters high; branches thorny; fruit brownish green, densely pubescent, bitter. Foliage ornamental.

Prunus tomentosa Thunb. Fl. Japon. 203. 1784.

First described from Japan.

Shui Mo Kou, near Lien Ch'eng, No. 335; T'u Er P'ing, No. 388. In woods and in the open.

A shrub, up to 4 meters high; fruit purplish brown (immature).

Prunus triloba Lindl. forma **multiplex** (Bunge) Rehd. Journ. Arn. Arb. 5: 216. 1924.

First described from northern China.

Wang Yeh Fu, No. 42. Cultivated in a garden.

A tree, 5 meters high; leaves greenish yellow, the veins prominent below; flowers pink, fragrant; ovary densely pubescent; fruit smooth, the stones finely pitted. This species is high ornamental because of its prolific, double, pink flowers.

Pyrus pashia Buch.-Ham. in D. Don, Prodr. Fl. Nepal. 236. 1825.

First described from Nepal.

Tai Wang Kou, No. 451; Middle Tu I Kou, No. 966. Along roadsides or stream banks. Rare.

A tree, 8 to 12 meters high; fruit purplish red, very acid, bitter, eaten by the Tibetans.

Rosa bella Rehd. & Wils. in Sarg. Pl. Wils. 2: 341. 1915.

First described from Shansi.

Shui Mo Kou, near Lien Ch'eng, No. 344. On bushy slopes. Common.

A large, dense shrub, 3 meters high; flowers pink.

Rosa davidii Crép. Bull. Soc. Bot. Belg. 13: 253. 1874 (Prim. Monogr. Ros. 260. 1874).

First described from David's Mongolian collections.

Lien Hua Shan, No. 1018. At edges of woods. Common.

A dense shrub, 2 meters high; fruit yellowish red.

Rosa omeiensis Rolfe, Curtis's Bot. Mag. 138: pl. 8471. 1912.

First described from Szechwan.

T'u Er P'ing, No. 398; T'ai Hua, No. 516; Lung Hua, No. 797. In open woods. Common.

A dense shrub, up to 2 meters high; flowers pink or red, fragrant.

Rosa rugosa Thunb. var. *chamissoniana* forma *rubro-plena* Rehd. Journ. Arn. Arb. 5: 204. 1924.

Huang Hsi Kou, No. 198. Along moist, exposed roadsides. Probably sometimes cultivated. Common.

A shrub, up to 3 meters high; flowers deep red, fragrant.

Rosa willmottiae Hemsl. Kew Bull. Misc. Inf. 1907: 317. 1907 (Curtis's Bot. Mag. 134: pl. 8186. 1908).

First described from plants grown from seeds collected by E. H. Wilson at Sung P'an, Szechwan.

Ch'ia Chi'ng Kou, No. 828. On dry, exposed slopes of hard clay. Common.

A dense shrub, 3 meters high; fruit yellowish red, sweet.

Rosa xanthina Lindl. forma *spontanea* Rehd. Journ. Arn. Arb. 5: 209. 1924.

First described from northern China.

Shui Mo Kou, Ho Lan Shan, No. 103. On bare, rocky slopes and along streams. Very common. Lanchow, No. 245. On a moist clay cliff. Rare.

A shrub, about 2 meters high; flowers a delicate bright yellow; calyx reflexed.

Rubus amabilis Focke, Bot. Jahrb. Engler 36, Beibl. 82: 53. 1905.

First described from Shensi.

Ni Ma Lang Kou, No. 762. In woods. Rare.

A shrub, up to 1.3 meters high; fruit brownish yellow, up to 2.5 cm. in diameter, sweet, edible.

Rubus idaeus L. Sp. Pl. 492. 1753.

First described from Europe.

T'ai Hua, No. 547. Along trails in *Betula* woods. Common.

A shrub, up to 50 cm. high; flowers white, fragrant; fruits eaten.

Rubus parvifolius L. Sp. Pl. ed. 2, 707. 1762.

First described from India.

Lien Hua Shan, No. 1028. On exposed, moist roadsides. Common.

A shrub, 3 meters high; fruit purplish red, sweet.

Rubus pileatus Focke, Hook. Icon. Pl. 20: pl. 1952. 1891, vel aff.

First described from Hupeh.

Shui Mo Kou, near Lien Ch'eng, No. 328 (rare); Ch'ia Ch'ing Kou, No. 837 (common). In woods.

A shrub, 1 meter high; stems thorny; flowers purplish, fruit yellowish red, covered with a thin, white tomentum, sweet, eaten locally.

Rubus pungens Cambess. in Jacquem. Voy. Ind. 4: 48. pl. 59. 1844.

First described from India.

Shui Mo Kou, No. 328a.

Rubus stans Focke, Notes Bot. Gard. Edinburgh 5: 76. 1911.

First described from Yunnan.

Ch'ia Ch'ing Kou, No. 841. On an exposed, fairly dry foothill of talus. Common.

A shrub, up to 1 meter high; fruit deep purple, edible.

Rubus xanthocarpus Bur. & Franch. Journ. de Bot. 5: 46. 1891.

First described from Szechwan.

Shih Men, No. 893. In patches along exposed, fairly moist roadsides. Common.
Herbaceous, 30 cm. high; fruit yellowish red, acid, edible.

Sanguisorba officinalis L. Sp. Pl. 116. 1753.

First described from Europe.

Shang Hsin Chuang, No. 685; Pan Ch'iao, No. 1014. In patches along moist roadsides or streams. Common.

Height up to 1.2 meters.

Sibbaldia procumbens L. Sp. Pl. 284. 1753.

First described from Europe.

Upper Ch'ia Ch'ing Kou, No. 872. On steppes. Common.

Fruit brown.

Sibiraea laevigata Maxim. var. *angustata* Rehd. in Sarg. Pl. Wils. 1: 455. 1913.

First described from western Szechwan and from Purdom's Kansu collections from Min Chou and Cho Ni.

T'u Er P'ing, No. 434; Hsi Mi Yai, No. 504 (?). In woods.

A much-branched shrub, up to 2.5 meters high.

Sorbaria arborea C. Schneid. Handb. Laubh. 1: 490. 1906.

First described from Hupeh.

Cho Ni, No. 994. Along exposed, moist, clay roadsides. Common.

A shrub, 3 meters high; flowers creamy white; calyx red.

Sorbaria arborea var. *glabrata* Rehd. in Sarg. Pl. Wils. 1: 48. 1912.

First described from western Hupeh and Szechwan.

Lien Ch'eng, No. 374. Very abundant, at flowering time whitening the valley and lower slopes.

A shrub; flowers creamy white, fragrant.

Sorbus hupehensis C. Schneid. Bull. Herb. Boiss. II. 6: 316. 1906; Handb.

Laubh. 1: 680. fig. 374r, 375n. 1906.

First described from Hupeh.

T'u Er P'ing, No. 407; Ni Ma Lang Kou, No. 751; Lung Hua, No. 798 (a variety); Shih Men, No. 920 (a variety?). In forests, sometimes associated with *Picea* and *Abies*. Common.

A shrub or small tree, up to 7 meters high; fruit red (except No. 798 reported as creamy white), highly acid. Very ornamental in flower and in fruit.

Sorbus koehneana C. Schneid. Bull. Herb. Boiss. II. 6: 316. 1906; Handb.

Laubh. 1: 681. fig. 374o. 1906.

First described from Hupeh.

T'u Er P'ing, Nos. 339, 422. In forests of *Betula*, *Salix*, and *Picea*. Common.

A shrub or small tree, 6 meters high; flowers creamy white.

Sorbus tapashana C. Schneid. Bull. Herb. Boiss. II. 6: 313. 1906; Handb.

Laubh. 1: 672. fig. 369b. 1906.

First described from northern Shensi.

A Ch'uan, No. 987. On partially shaded foothills. Fairly common.

A shrub, 6 meters high; fruit bright red. Very ornamental in fruit.

Spiraea canescens D. Don var. *glaucophylla* Franch. Pl. Delav. 1:200. 1890.

First described from Yunnan.

Shui Mo Kou, Ho Lan Shan, No. 84. Common, but only one bush found in bloom. Nan Ssu Kou, No. 149. Very common.

A shrub, up to 3 meters high; flowers white, very abundant on long, slender, curving branches; fruits of previous year persistent, brown. Highly ornamental.

PSpiraea fritschiana C. Schneid. Bull. Herb. Boiss. II. 5: 347. 1905.

First described from Shantung.

T'u Er P'ing, No. 338. In open *Picea* woods. Common.

A shrub, 1.3 meters high.

PSpiraea gemmata Zabel, Strauch. Spir. Deutsch. Gärt. 23. 1893.

First described from Mongolia.

T'ai Hua, No. 544. In woods. Common.

A shrub, up to 1.3 meters high; flowers white, fragrant.

PSpiraea hypericifolia L. Sp. Pl. 489. 1753.

First described from Canada.

Shui Mo Kou, Ho Lan Shan, No. 96. On exposed, moist foothills in the valley. Common.

A shrub, 1.5 meters high; flowers small, white.

Spiraea longigemmis Maxim. Act. Hort. Petrop. 6: 205. 1879.

First described from Przhevalski's and Piasetski's Kansu collections.

T'u Er P'ing, No. 420. In woods. Very common.

A shrub, up to 5 meters high; flowers creamy white, fragrant.

LEGUMINOSAE

Astragalus adsurgens Pall. Sp. Astrag. 40. pl. 31. 1880.

First described from Transbaikalia.

Hsi Mi Yai, No. 490; Ho Lan Shan, No. 1091. On exposed, clay banks, bushy places, and margins of cultivated fields. Common.

Spreading and trailing herbs, up to 1 meter long; flowers purple or blue.

Astragalus chingianus Peter-Stibal, Medd. Bot. Trädg. Göteborg 12: 36. 1937.

Based on *Licent 5476* from the Ordos.

Ho Lan Shan, No. 1048. On margins of forests. Common.

Height 18 cm.; flowers greenish yellow.

Astragalus chrysopterus Bunge, Bull. Acad. Sci. St. Pétersb. 24: 32. 1878 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 51. 1878).

First described from Kansu (without citation of a specimen).

T'ai Hua, No. 548. On margins of woods. Rare.

Height up to 50 cm.; flowers greenish yellow.

Astragalus discolor Bunge, Bull. Acad. Sci. St. Pétersb. 24: 33. 1878 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 53. 1878).

First described from the "Alashan Mts." (=Ho Lan Shan) and the Ordos, Mongolia (without citation of specimens).

Ho Lan Shan, No. 1109. In woods. Common.

Height 45 cm.; flowers purplish blue.

Astragalus floridus Benth. in Bunge, Mém. Acad. Sci. St. Pétersb. VII. 11¹⁰: 24. 1868; VII. 15¹: 28. 1869; in Baker, in Hook. f. Fl. Brit. Ind. 2: 127. 1876.

First described from India.

Shih Men, No. 927. On steppes. Fairly common.

Height 60 cm.; several stems arising from one root.

Astragalus hoantchy Franch. Nouv. Arch. Mus. Hist. Nat. (Paris) II. 5: 238. 1883 (Pl. David. 1: 86. 1884).

First described from A. David's Mongolian collections.

Shui Mo Kou, Ho Lan Shan, No. 87. On an exposed rocky slope. Rather rare.

Height 75 cm.; flowers purple.

Astragalus aff. hyogaeus Ledeb. Icon. Pl. Fl. Ross. Alt. 1: 23. *pl.* 95. 1829; Fl. Alt. 3: 329. 1831.

First described from the Altai Mountains.

Hung Yang Tung, No. 17. On coarse sand and gravelly soil on exposed dry foothills, associated with *Astragalus* sp., No. 18. Rare.

A perennial herb, 2.5 to 5 cm. high; leaves and creamy white flowers almost buried.

Astragalus longilobus Peter-Stibal, Medd. Bot. Trädg. Göteborg 12: 47. 1937.

First described from Rock's "Tebbu Land," Kansu collection.

Shih Men, No. 918. On steppes and edges of forests on the southern ridge only. Fairly common.

Height up to 75 cm.; roots bearing 3 or 4 stems; fruit greenish brown.

Astragalus melilotoides Pall. Reise Prov. Russ. Reich. 3²: 748. *pl. Dd. fig.* 1, 2. 1776.

First described from Siberia.

T'ai Hua, No. 557. Along a partially shaded, moist roadside. Rare. Height up to 1 meter; flowers white.

Astragalus monadelphus Bunge, Bull. Acad. Sci. St. Pétersb. 24: 32. 1878 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 52. 1878).

First described from Kansu (without citation of a specimen).

T'u Er P'ing, No. 427. In a forest. Common.

Height up to 45 cm.; flowers greenish yellow.

Astragalus przewalskii Bunge, Bull. Acad. Sci. St. Pétersb. 24: 32. 1878 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 52. 1878).

First described from Kansu (without citation of specimens).

T'ai Hua, No. 540. In a partially shaded ravine. Rare.

Height up to 75 cm.; flowers deep purple; stems purplish.

Astragalus variabilis Bunge, Bull. Acad. Sci. St. Pétersb. 24: 33. 1878 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 53. 1878).

First described from the left bank of the Yellow River in Mongolia (without citation of specimens).

Pei Ssu Kou, No. 112. On exposed, moist farm clay. Common.

Height 18 cm.; flowers purplish violet.

Astragalus spp.

1. Lang Shan, No. 16. On foothills, associated with and very similar to No. 49. The most common species locally.

Perennial herbs, 5 to 10 cm. high growing in head-shaped groups 30 to 60 cm. in diameter; flowers purplish, faintly fragrant.

2. Hung Yang Tung, No. 18. Along roadsides, extending over a wide area. Fairly common.

A spreading herb, 13 cm. high; flowers purplish, appearing soon after the leaves. This species is eaten by animals.

3. Ha La Hu Kou, No. 49. On an exposed gravelly foothill, associated with No. 16.

Height 15 cm.; flowers creamy white, faintly tinged with pink.

4. Shui Mo Kou, Ho Lan Shan, No. 102. On exposed, gravelly valley bottoms.

Height 13 cm.; flowers creamy white.

5. Ho Lan Shan, No. 1073. In pure stands in a dense *Picea* forest. Common. Height up to 45 cm.; flowers greenish yellow.

6. Ho Lan Shan, No. 1156. (Without field label.)

Caragana brevifolia Komar. Act. Hort. Petrop. 29: 211. 1908.

First described from Kashmir and from Ladygin's Kansu collections.

T'u Er P'ing, No. 403; Labrang, No. 774. On exposed, moist ridges and in shaded woods. Common.

A shrub, up to 1.5 meters high; flowers greenish yellow.

Caragana jubata (Pall.) Poir. in Lam. Encycl. Suppl. 2: 89. 1811.

First described without locality.

Upper Ch'ia Ch'ing Kou, No. 853; Ho Lan Shan, No. 1147. On steppes and bushy slopes and as undergrowth in *Picea* forests at high altitudes. Common.

A shrub, up to 1.5 meters high in open, up to 2.4 meters high in forests; stems long, extremely tough, seldom branching; flowers creamy white, fragrant.

Caragana aff. jubata (Pall.) Poir.

Pei Ssu Kou, No. 108. In large compact, head-shaped clumps, dotting dry, exposed, rocky ridges.

Semiherbaceous; height 10 cm.; flowers purple, fragrant. Highly ornamental.

Caragana maximowicziana Komar. Act. Hort. Petrop. 29: 269. pl. 11. fig. B. 1909.

First described from Potanin's and Ladygin's Kansu collections and from Tibet.

Lien Hua Shan, No. 1021. Along dry, exposed roadsides. Common.

A shrub, forming dense thickets, 3 meters high; fruit brown.

Caragana opulens Komar. Act. Hort. Petrop. 29: 208. 1908.

First described from Przhevalski's Kansu collections and from his and Artselaer's Mongolian collections.

Hsi Yeh Kou, No. 162. In exposed rocky places. A very common shrub locally and in Inner Mongolia, sometimes forming dense thickets, up to 6 meters high. Yao Chieh, No. 260. On moist grassy and bushy slopes. A common shrub, up to 1.5 meters high.

Branches distinctly shining brown; flowers greenish to lemon-yellow.

Caragana pygmaea (L.) DC. Prodr. 2: 268. 1825.

First described from Siberia.

Hung Yang Tung, No. 19; Wang Yeh Fu, No. 25; Shui Mo Kou, Ho Lan Shan, No. 85; Nan Ssu Kou, No. 155. On sand dunes and exposed rocky slopes, usually in pure stands, sometimes associated with *Zygophyllum xanthoxylum* (Bunge) Engl. Common.

A semiwoody, dwarf shrub, 18 cm. to 1.2 meters high; flowers appearing early or with the leaves, bright yellow, becoming dark brown.

Caragana roborovskyi Komar. Act. Hort. Petrop. 29: 280. 1909.

First described from the Kohonor region.

Ha La Hu Kou, No. 73. On exposed rocky slopes. Fairly common.

A shrub, up to 1 meter high; flowers bright yellow, becoming brown.

Caragana tangutica Maxim. in Komar. Act. Hort. Petrop. 29: 286. 1909.

First described from Przhevalski's Kansu collections.

T'u Er P'ing, No. 385. In *Picea* forests at high altitudes. Common.

An undershrub, up to 1.8 meters high.

Caragana tibetica Komar. Act. Hort. Petrop. 29: 282. pl. 10. 1909.

First described from Potanin's and Przhevalski's Kansu and Szechwan collections.

Nan Ssu Kou, No. 156. In compact patches up to several feet across and 20 cm. high, on dry exposed rocky slopes and level places in foothills. The commonest species of *Caragana*.

Flowers yellow.

Coluria longifolia Maxim. Bull. Acad. Sci. St. Pétersb. 27: 466. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 215. 1881).

First described from Przhevalski's Kansu collections.

La Chi Tzu Shan, No. 701. On exposed, moist steppes. Common.

Height 60 cm.; flowers orange-yellow.

Glycyrrhiza uralensis Fisch. in Seringe, in DC. Prodr. 2: 248. 1825.

First described from western Siberia.

Pei Ssu Kou, No. 188; Ho Lan Shan, No. 1060. In exposed, dry places.

Common over a wide range.

Height up to 1 meter; flowers deep purple. The long, cylindrical, very sweet tap roots producing licorice, one of the best tonics in Chinese medicine, are exported from here.²⁴

Gueldenstaedtia diversifolia Maxim. Bull. Acad. Sci. St. Pétersb. 27: 462. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 209. 1881).

First described from Przhevalski's Kansu collections.

T'ai Hua, No. 536; Lang Tzu T'ang Kou, No. 595. Occasionally found on partially shaded, moist slopes, commoner in woods.

A prostrate herb, up to 20 cm. high.

Hedysarum multijugum Maxim. Bull. Acad. Sci. St. Pétersb. 27: 464. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 212. 1882).

First described from Mongolia and Kansu.

Chung Wei (?), No. 237 (without field label).

Hedysarum polybotrys Hand.-Mazz. Symb. Sin. 7: 563. 1933.

Ch'ia Ch'ing Kou, No. 842 (type).^{24a} On dry, exposed, rocky slopes. Common.

Height 1.2 meters; flowers greenish yellow.

Hedysarum pumilum (Ledeb.) Fedtsch. Act. Hort. Petrop. 19: 309. 1902.

First described from the Altai Mountains.

Ha La Hu Kou, No. 46; Ch'ia Te Kou, No. 159. On exposed, coarse, gravelly or rocky slopes and roadsides. Common.

Height 10 cm.; leaves very inconspicuous; flowers conspicuous, bright red or pink.

Hedysarum sp.

Lang Tzu T'ang Kou, No. 582.^{24b} In densely shaded woods. Rare.

Height 18 cm.; flowers pink.

Lathyrus pratensis L. Sp. Pl. 733. 1753.

First described from Europe.

Ch'ia Ch'ing Kou, No. 824. Under a *Berberis* bush. Rare.

A climbing herb, up to 1 meter long; flowers lemon-yellow.

Lespedeza daurica (Laxm.) Schindl. Repert. Sp. Nov. Fedde 22: 274. 1926.

First described from Dahuria.

Near Ch'ien Kou, No. 1011. In tufts on dry, exposed, clay cliffs. Fairly common.

Height 30 cm.; fruit brownish.

²⁴ For further data on this root in Mongolia see E. V. Bretschneider, History of European botanical discoveries in China, p. 990 (1898), and J. W. Palibin in Trav. Sous-sect. Troitzk. Kiakhta Sect. Amour Soc. Russ. Géogr. 6¹: 7-20. 1903, and in Vîestn. Ross. Obsheh. Sad. 1903: 47-52. 1903, both in Russian.

^{24a} Ching's collector's number was omitted from the original description of this species, apparently through oversight.

^{24b} The specimen is identical with *Purdom* 1051, collected near Cho Ni in 1911.

Lespedeza floribunda Bunge, Pl. Mong.-Chin. 13. 1835.

First described from near Peking.

Ha Ho, No. 1042. On dry, exposed, clay slopes. Rare.

Height 30 cm.

Medicago lupulina L. Sp. Pl. 779. 1753.

First described from Europe.

Chung Wei, No. 218; Yao Chieh, Nos. 267, 294; Ho Lan Shan, No. 1119. At edges of cultivated fields, on dry, exposed, clay cliffs, or on moist grasslands.

An erect or prostrate herb, up to 30 cm. high; flowers yellow.

Medicago sativa L. Sp. Pl. 788. 1753.

First described from Spain.

Pei Ssu Kou, No. 186. On the edges of moist, rich farmlands. Common, spreading over a large area.

Height 50 cm.; flowers purple.

Melilotus alba Desv. in Lam. Encycl. 4: 63. 1796.

First described from Siberia and Europe.

Hsi Mi Yai, No. 480. On moist foothills. Common.

Height up to 1.2 meters; flowers bright yellow.

Oxytropis glabra DC. Astragal. 95. pl. 8. 1802.

First described from Siberia.

Ho Lan Shan, No. 1068. In woods. Common.

Height 30 cm.; flowers purplish blue.

Oxytropis imbricata Komar. Repert. Sp. Nov. Fedde 13: 232. 1914.

First described from Potanin's Kansu collections.

Hsin Ch'eng, west of Lanchow, No. 309. Along dry, exposed, sandy roadsides. Common.

A procumbent herb; flowers yellowish; very drought-resistant.

Oxytropis melanocalyx Bunge, Mém. Acad. Sci. St. Pétersb. VII. 22¹: 8. 1874, vel. aff.

First described from Przhevalski's Kansu collections.

Hsin Ch'eng, west of Lanchow, No. 309a.

Oxytropis aff. yunnanensis Franch. Pl. Delav. 1: 163. 1890.

First described from Yunnan.

La Ch'iung Kou, No. 632. On exposed, dry, gravelly stream bottoms. Common.

A spreading herb, up to 20 cm. high, with a long taproot.

Oxytropis spp.

1. Chung Wei, No. 232a. On alkaline soil beside a cultivated field.

2. Chung Wei, No. 233. On a dry, exposed, clay cliff.

Height 30 cm.; flowers yellow.

3. Yao Chieh, No. 250. Along a moist, sandy roadside.

A procumbent herb, 1.2 meters high; flowers blue.

4. T'u Er P'ing, No. 415. Forming a thick carpet on the ridge in a woods and on exposed grasslands. Very common.

Height up to 45 cm.; flowers greenish yellow.

Piptanthus mongalicus Maxim. in Komar. Bot. Zhurn. SSSR. 18: 59. 1 fig. 1933.

First described from Kozlov's collections in the Alashan Mountains, Mongolia, and adjacent Kansu.

Ta Shui Kou, No. 22. In pure stands of bushlike clusters, occupying an extensive range, on coarse sandy soil near foothills. Very common.

An evergreen, semiwoody shrub, up to 1.2 meters high; flowers abundant, bright yellow, fragrant. Very ornamental; not eaten by domestic animals.

Sophora alopecuroides L. Sp. Pl. 373. 1753.

First described from "Oriente."

Mouth of Hsi Yeh Kou, No. 181. On dry, exposed foothills. Common.

Height up to 50 cm.; flowers yellow, very fragrant, in columnar inflorescences.

Swainsona salsula (Pall.) Taub. in Engl. & Prantl. Pflanzenfam. 3³: 281. 1894.

First described from Dahuria.

Pei Ssu Kou, No. 191; Yao Chieh, No. 285; Ho Lan Shan, No. 1117. On edges of fields and along roadsides and on dry clay cliffs. Common.

A dense herb, up to 60 cm. high; flowers bright purplish red. Very ornamental in bloom.

Thermopsis lanceolata R. Br. in Ait. Hort. Kew. ed. 2, 3: 3. 1811.

First described from Siberia.

Wang Yeh Fu, No. 45. In patches on exposed, clay soil on a farm. Common.

Height 25 cm.; flowers greenish yellow.

Thermopsis sp.

Ch'ing Kang Yai, No. 577. In woods and on exposed, dry slopes and along roadsides. Common.

Height up to 45 cm.

Vicia amoena Fisch. in Seringe, in DC. Prodr. 2: 255. 1825.

First described from Siberia.

Hsi Mi Yai, No. 487; Lower Tu I Kou, Nos. 957, 958. In woods and along exposed, moist, clay roadsides. Fairly common.

Stems up to 1.8 meters long; flowers purple.

Vicia cracca L. Sp. Pl. 735. 1753.

First described from Europe.

Hsün Hua Hsien, No. 737; Shih Men, No. 895. In a dense stand on an exposed, dry, clay cliff and along a moist, clay roadside. Common.

Stems up to 1.5 meters long; flowers purple.

Vicia sativa L. Sp. Pl. 736. 1753.

First described from Europe.

Yao Chieh, No. 271; Ho Lan Shan, No. 1068a. At edges of cultivated fields and in woods.

Flowers blue.

Vicia tridentata Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 93. 1833 (Enum. Pl. China Bor. 19. 1835).

First described from Peking.

Lien Ch'eng, No. 455. On a farm. Common.

Height up to 1.5 meters; flowers purple.

Vicia unijuga A. Br. Ind. Sem. Hort. Berol. Append. 1853: 12. 1853²⁵ (Ann. Sci. Nat. IV. 1: 366. 1854).

First described as *Orobus lathyroides* L. from Siberia, according to the alternative reference.

Shui Mo Kou, near Lien Ch'eng, No. 356; Lower Tu I Kou, No. 963. On edges of woods and along exposed roadsides.

Height up to 50 cm.; flowers purplish blue; fruit brown.

²⁵ This reference, derived from Index Kewensis, could not be verified by me. It is probably a *nomen nudum*.

GERANIACEAE

Biebersteinia heterostemon Maxim. Bull. Acad. Sci. St. Pétersb. 27: 439. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 176. 1881).

First described from Piasetsk's and Przhevalski's Kansu collections from near Lanchow.

Yao Chieh, No. 268. At the moist edge of a cultivated field.

Height 1.3 meters; flowers yellowish; plant peculiarly aromatic.

Erodium stephanianum Willd. Sp. Pl. 3: 625. 1800.

First described from Dahuria.

Pei Ssu Kou, No. 124. On moist, exposed margins of streams. Common.

Flowers purplish.

Geranium eriostemon Fisch. in DC. Prodr. 1: 641. 1824.

First described from Dahuria.

Shui Mo Kou, near Lien Ch'eng. No. 330; T'u Er P'ing, No. 412. In woods

Height 60 cm.; flowers pinkish or purplish.

Geranium pratense L. Sp. Pl. 681. 1753.

First described from Europe.

Lien Ch'eng, No. 396; T'u Er P'ing, No. 431. In forests and on dry, exposed, clay cliffs. Common.

Height up to 60 cm.; flowers violet.

Geranium pylzowianum Maxim. Bull. Acad. Sci. St. Pétersb. 26: 466. 1880 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 633. 1880).

First described from Przhevalski's Kansu collections from the Ta T'ung Valley.

T'u Er P'ing, No. 418; Hsi Mi Yai, No. 500. On moist grasslands or on forest floors. Common.

Flowers pink.

Geranium sibiricum L. Sp. Pl. 683. 1753.

First described from Siberia.

Liu Fu Yai, No. 466; Ho Lan Shan, No. 1092. Along exposed, moist roadsides and on bushy slopes. Common.

Stems creeping, up to 45 cm. long; flowers purplish or pink.

ZYGOPHYLLACEAE

Nitraria schoberi L. Syst. Nat. ed. 10, 1044. 1759.

First described from Siberia.

Wang Yeh Fu, No. 130; Hsin Ch'eng, north of Ningsia, No. 211. On sand dunes and along fairly moist, clay roadsides. One of the most abundant plants in the deserts of Inner Mongolia.

A shrub, up to 2.5 meters high, with creeping branches; flowers greenish yellow, abundant, highly fragrant; fruit a red, edible drupe. An important source of fuel in deserts.

Peganum harmala L. Sp. Pl. 444. 1753.

First described from the Mediterranean region.

Wang Yeh Fu, No. 44. Along exposed roadsides. Fairly common.

A spreading herb, 30 cm. high; flowers greenish or creamy white.

Peganum nigellastrum Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 87. 1833 (Enum. Pl. China Bor. 87. 1835).

First described from northern China and Mongolia.

Mouth of Hsi Yeh Kou, No. 176; Ho Lan Shan, No. 1115. On exposed, gravelly or clay hillsides. Common, covering an extensive area.

A spreading and somewhat prostrate herb, up to 45 cm. high; flowers pinkish or white, fragrant.

Tribulus terrestris L. Sp. Pl. 387. 1753.

First described from southern Europe.

Yao Chieh, No. 251. On dry, exposed edges of cultivated fields. Common.

A prostrate herb, 45 cm. high; flowers yellow.

Zygophyllum mucronatum Maxim. Bull. Acad. Sci. St. Pétersb. 27: 438. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 175. 1881).

First described from Przhevalski's and Piasetski's Kansu collections from near Lanchow.

Nan Ssu Kou, No. 135; Yao Chieh, No. 246 (?). On coarse desert sands and along gravelly roadsides. Common.

Leaves and stems deep green, very succulent; flowers white.

Zygophyllum xanthoxylum (Bunge) Engl. in Engl. & Prantl. Pflanzenfam. 3 4: 81. 1890.

First described from the Gobi Desert in Mongolia.

Hung Yang Tung, No. 20; Wang Yeh Fu, No. 129. On sand dunes in deserts of Inner Mongolia. Very common.

A semiwoody shrub, up to 1.5 meters high, the stems crooked, rooting freely; flowers yellowish, appearing with the leaves, abundant, faintly fragrant. Used as fuel. Highly ornamental because of the leaves and flowers.

RUTACEAE

Dictamnus fraxinella Pers. Syn. Pl. 1: 464. 1805.

First described from Europe.

Lien Hua Shan, No. 1027. In *Betula* woods. Common.

Herb, 75 cm. high.

Haplophyllum tragacanthoides Diels, Notizbl. Bot. Gart. Berlin 9: 1028. 1926.

Pei Ssu Kou, No. 107 (type). On dry, exposed, rocky ridges or cliffs. Common.

A low, compact, shrubby herb, 20 cm. high; flowers greenish yellow, extremely sweet, highly ornamental, dotting the cliffs with yellow.

POLYGALACEAE

Polygala sibirica L. Sp. Pl. 702. 1753.

First described from Siberia.

Chen Mu Kuan, No. 164; Ningsia, No. 1145. On exposed gravelly slopes and on disintegrated shells by roadside. Rare.

Height up to 18 cm.; flowers purple.

EUPHORBIACEAE

Euphorbia esula L. Sp. Pl. 461. 1753.

First described from Europe.

Nan Ssu Kou, No. 151. On a shaded valley bottom of rich soil. Rare.

Herb, 23 cm. high.

Euphorbia humifusa Willd. Hort. Berol. Suppl. 27: 27. 1813.

First described from cultivation.

Yao Chieh, No. 256. Along an exposed, moist roadside.

A procumbent herb.

Euphorbia macrorhiza C. A. Meyer in Ledeb. Fl. Alt. 4: 191. 1833; Icon. Pl. Ross. 2: 26. pl. 192. 1830.

First described from the Altai Mountains.

T'ai Hua, No. 522. On moist exposed slopes. Common.

Stem red; flowers green.

Securinega ramiflora Muell. Arg. in DC. Prodr. 15²: 449. 1862.

First described from Dahuria and Amur.

Pei Ssu Kou, No. 193. In the bottom of a dry, rocky gorge. Rare.

Shrub, 3 meters high; flowers greenish yellow.

CELASTRACEAE

Evonymus amygdalifolia Franch. Bull. Soc. Bot. France 33: 453. 1886.

First described from Yunnan.

Ch'ia Ch'ing Kou, No. 844. In woods. Rare, only one specimen found.

A shrub, up to 1 meter high; fruit reddish; seeds red.

Evonymus giraldii Loesener var. *angustialata* Loesener in Sarg. Pl. Wils. 1: 495. 1913.

First described from western Hupeh and Szechwan.

Upper Shui Mo Kou, near Lien Ch'eng, No. 380; Malisoondo, No. 886. In woods. Fairly common.

A graceful shrub, 1 to 3 meters high, with drooping branches; fruit reddish purple; seeds reddish yellow.

Evonymus nanoides Loes. & Rehd. in Sarg. Pl. Wils. 1: 492. 1913.

First described from western Szechwan.

Upper Ch'ia Ch'ing Kou, Nos. 847, 935. Rare, on dry, exposed, clay and gravelly slopes. Yang She, No. 1039. On cliffs. Common.

A dense, dwarf shrub of irregular form, up to 1 meter high; flowers reddish; fruit purplish red; seed yellowish red.

Evonymus nanus Bieberst. Fl. Taur. Cauc. 3: 160. 1819.

First described from the western Caucasus.

Shui Mo Kou, near Lien Ch'eng, Nos. 327, 389. On bushy slopes or in woods. Common.

A slender shrub, up to 4 meters high, the stem often single with slender branches; flowers purple.

Evonymus phellomana Loesener in Diels, Bot. Jahrb. Engler 29: 444. 1900.

First described from Shensi (?).

Ch'ia Ch'ing Kou, No. 833. In wood. Rare.

A shrub, up to 3 meters high, the branches and twigs with 4 corky ridges.

Evonymus przewalskii Maxim. Bull. Acad. Sci. St. Pétersb. 27: 451. 1882 (Mél. Biol. Acad. Sci. Pétersb. 11: 194. 1881).

First described from Przhevalski's Kansu collections.

Ch'ing Kang Yai, No. 574. In densely shaded woods. Rare. Lower Tu I Kou, No. 962. Along roadsides. Common.

A low, dense shrub, 1 meter high; stems and branches green; fruit purplish red; calyx red.

ACERACEAE

Acer davidi Franch. Nouv. Arch. Mus. Hist. Nat. (Paris) II. 8: 212. 1885 (Pl. David. 2: 30. 1888).

First described from western Szechwan.

Shui Mo Kou, near Lien Ch'eng, No. 321. In woods.

A small tree, 8 meters high; stems and branches dark green.

Acer ginnala Maxim. Bull. Phys. Math. Acad. Sci. St. Pétersb. 15: 126. 1856 (Mél. Biol. Acad. Sci. St. Pétersb. 2: 415. 1857).

First described from Amur and Ussuri.

Ha Ho, No. 1022. In woods and on bushy slopes. Fairly common.

A small tree, up to 9 meters high; bark brownish gray.

Acer maximowiczii Pax, Hook. Icon. Pl. 19: text to *pl.* 1897. 1889.

First described from Hupeh.

Lien Hua Shan, No. 1009. In woods of *Betula*, *Salix*, *Acer*, *Tilia*, etc. Common.

A small tree, 12 meters high, sometimes bushlike, bark gray, rough on old stems, deep green on young twigs.

Acer tetramerum Pax var. *betulifolium* Rehd. in Sarg. Pl. Wils. 1: 95. 1911.

First described from Szechwan, Kansu (Potanin's collections), and Shensi.

Shui Mo Kou, near Lien Ch'eng, No. 323; Lien Hua Shan, Nos. 1008, 1010. In woods. Common.

A treelike shrub, 6 meters high; bark purplish; fruit purplish when mature.

SAPINDACEAE

Xanthoceros sorbifolia Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 85. 1833 (Enum. Pl. China Bor. 11. 1835).

First described from northern China.

Pei Ssu Kou, No. 122. On moist soil at the upper end of the valley. Only one tree found, this a mass of white.

Height 5 meters; petals white with a purplish base, each alternating with a bright yellow, rudimentary petal; fruit said to be sweet and edible.

BALSAMINACEAE

Impatiens sp.

Shih Men, No. 905. Rare, in woods in a gorge.

RHAMNACEAE

Rhamnus leptophyllus C. Schneid. Notizbl. Bot. Gart. Berlin 5: 77. 1908.

First described from Hupeh and Szechwan.

T'u Er P'ing, No. 345; Tai Walg Kou, No. 441; T'ien T'ang Ssu, No. 559; Ch'ia Ch'ing Kou, No. 829; Hsin Ch'eng, south of Lanchow, No. 1031. On dry hillsides, and gravelly valley bottoms, and along roadsides. Common.

A shrub, 1 to 5 meters high, with a spreading crown; fruit deep purple or black. Very ornamental in fruit.

Rhamnus parvifolius Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 88. 1833 (Enum. Pl. China Bor. 88. 1835).

First described from near Peking.

Ho Lan Shan, No. 205. On bare, exposed, dry, rocky slopes. Common.

A low shrub, 2 meters high; flowers greenish yellow.

Zizyphus jujuba Mill. Gard. Dict. ed. 8, No. 1. 1768.

First described from cultivation in Europe.

Chung Wei, No. 223. Cultivated trees up to 12 meters high, on fairly moist clay soil. No. 227. Wild shrubs about 1 meter high, on the exposed sandy banks of the Yellow River.

Flowers greenish yellow. The fruits are eaten.

VITACEAE

Ampelopsis japonica (Thunb.) Makino, Bot. Mag. Tokyo 17: 113. 1903.

First described from Japan.

Pei Ssu Kou, No. 190. On dry, rocky foothills. Common.

A vine, up to 9 meters long, climbing on bushes; flowers greenish yellow; leaves shining green.

TILIACEAE

Tilia chinensis Maxim. Act. Hort. Petrop. 11: 83. 1890.

First described from Potanin's and Piesetski's Kansu collections.

Lien Hua Shan, No. 1020. On northern slopes, associated with *Betula*, *Acer*, and *Salix*. Common.

A tree with greenish fruits and purplish winter buds. Wood of good quality, used for furniture.

MALVACEAE

Malva verticillata L. Sp. Pl. 689. 1753.

First described from China and Syria.

La Chi Tzu Shan, No. 719; Ho Lan Shan, No. 1100. In exposed moist cultivated fields. Common.

Height 30 cm.; flowers pink.

ACTINIDIACEAE

Clematoclethra actinidioides Maxim. Act. Hort. Petrop. 11: 38. 1890.

First described from Potanin's and Piasetski's Kansu collections.

Lien Hua Shan, No. 1026. In woods. Common.

A large, dense vine, 16 meters long, climbing on trees and often killing them; fruit purple.

Clematoclethra integrifolia Maxim. Act. Hort. Petrop. 11: 38. 1890.

First described from Potanin's and Piasetski's Kansu collections.

Ch'ia Ch'ing Kou, No. 940. In partially shaded woods. Rare.

A low shrub, 2 meters high; fruits purplish red, with slender beak.

HYPERICACEAE

Hypericum aff. *monanthemum* Hook. f. & Thoms. in Thiselt.-Dyer, in Hook. f. Fl. Brit. Ind. 1: 256. 1874.

First described from Sikkim.

T'u Er P'ing, No. 409. Growing in tufts in woods. Rare.

Height 50 cm.; flowers bright yellow.

TAMARICACEAE

Hololachna songarica (Pall.) C. G. Ehrenb. Linnaea 2: 273. 1827.

First described from Sungaria.

Yao Chieh, No. 248; Hsün Hua Hsien, No. 738; 25 li from Ch'ien Kou, No. 1013. On dry, exposed, bare, clay slopes and cliffs and on gravel by streams. Common.

A dense, shrubby herb, up to 1 meter high; flowers white. Very drought-resistant.

Myricaria germanica (L.) Desv. Ann. Sci. Nat. 4: 349. 1825.

First described from Germany.

Yao Chieh, No. 295. On a frequently submerged, sandy river beach. Common, occupying a large area.

A coarse shrub, up to 2.4 meters high.

Tamarix chinensis Lour. Fl. Cochinch. Ed. Willd. 1: 228. 1793.

First described from Canton.

Wu Ch'uan Shan, No. 238. On a farm of moist clay soil. Often cultivated.

Usually a small tree, often a shrub, up to 8 meters high; flowers pink, fragrant.

VIOLACEAE

Viola biflora L. Sp. Pl. 936. 1753.

First described from Europe.

Wang Te Lin Kou, No. 82; T'ai Hua, No. 506; Ho Lan Shan, No. 1151. On shaded, moist roadsides, in a *Juniperus* forest, and on a shaded rocky cliff. Rare. Flowers bright yellow, marked within with purplish lines.

Viola chingiana Becker, Proc. Biol. Soc. Washington 38: 117. 1925.

Ta P'an Shan, No. 648 (type). On exposed, moist, grassy slopes. Common. Stem deeply buried; fruit green, triangular, hidden.

Viola pinnata L. subsp. *multifida* Becker, Repert. Sp. Nov. Fedde Beih. 12: 439. 1922.

First described from Hopeh.

Ha La Hu Kou, No. 56; Shui Mo Kou, Ho Lan Shan, No. 89. On shaded or exposed roadsides or stream banks, sometimes several growing together, the leaves under the grass, the delicate reddish flowers appearing above. Rare.

Viola prionantha Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 82. 1833 (Enum. Pl. China Bor. 8. 1835).

First described from northern China.

Ha La Hu Kou, No. 66. On moist, rich, shaded soil. Very common. Flowers white, faintly tinted with purple.

THYMELAEACEAE

Daphne giraldii Nitsche, Beitr. Kennt. Daphne 7. 1907.

First described from northern Shensi.

Lien Ch'eng, No. 367. On a bushy slope.

A low, many-stemmed shrub, 60 cm. high; bark exceedingly tough; fruit yellowish red.

Daphne tangutica Maxim. Bull. Acad. Sci. St. Pétersb. 27: 531. 1881 (Mém. Biol. Acad. Sci. St. Pétersb. 11: 309. 1881).

First described from Przhevalski's Kansu collections.

Lung Hua, No. 794. In partially exposed places in woods. Common.

A low, dense shrub, up to 60 cm. high; stems tough; fruit a deep-red berry; seeds with a black husk.

Hippophae rhamnoides L. var. *procera* Rehd. in Sarg. Pl. Wils. 2: 409. 1915.

First described from western Szechwan.

Upper Shui Mo Kou, near Lien Ch'eng, No. 390; Ni Ma Lang Kou, No. 755. In valley bottoms. Common.

A dense, thorny shrub, up to 6 meters high, often forming almost impenetrable scrub or thickets at high altitudes; fruit highly acid, but eaten when ripe and bright yellow.

Stellera chamaejasme L. Sp. Pl. 559. 1753.

First described from Siberia.

Chung Wei, No. 226. On exposed, bare, sandy slopes.

Height 23 cm.; flowers purplish, very fragrant.

ELAEAGNACEAE

Elaeagnus angustifolia L. Sp. Pl. 121. 1753.

First described from Europe.

Hsi Yeh Kou, No. 179. Commonly cultivated on fairly moist, rich soil here and in Wang Yeh Fu.

A tree, up to 12 meters high, of willowlike form, the trunk crooked, the crown umbrella-shaped, the bark peeling off in long flakes; branches thorny, brown;

leaves silvery; flowers abundant, yellow inside, silvery outside, exceedingly fragrant (can be detected at a distance of 1 li); fruit large, sweet, edible.

Elaeagnus umbellata Thunb. Fl. Japon. 66. pl. 14. 1784.

First described from Japan.

Lien Hua Shan, No. 1016. On dry, exposed, clay banks. Fairly common.

A shrub, up to 6 meters high; fruit brownish, sweet.

ONAGRACEAE

Chamaenirion angustifolium (L.) Scop. Fl. Carn. ed. 2, 1: 271. 1772.

First described from Europe.

T'u Er P'ing, Nos. 401, 438; Ho Lan Shan, No. 1064. In *Betula* woods, sometimes covering an extensive area. Common.

Height up to 1.2 meters; flowers red or pink.

?**Epilobium tanguticum** Hausskn. Oesterr. Bot. Zeitschr. 29: 56. 1879.

First described from Przhevalski's Kansu collections.

Ch'ing Kang Yai, No. 575; Shih Men, No. 909. In partially shaded woods and on banks of streams. Common.

Height up to 60 cm.; flowers pink or purple.

ARALIACEAE

Acanthopanax giraldii Harms, Bot. Jahrb. Engler 36, Beibl. 82: 80. 1905.

First described from Shensi.

Malisoondo, No. 887. At edge of woods. Common.

A dense, prickly, highly aromatic shrub, up to 2.5 meters high.

Acanthopanax giraldii var. *pilosulus* Rehd. Journ. Arn. Arb. 9: 99. 1928.

First described from Rock's Kansu collections.

Shui Mo Kou, near Lien Ch'eng, No. 337. On a wooded slope. Common, associated with *Sorbaria*, *Acer*, *Picea*, etc.

A shrub, up to 6 meters high; flowers yellowish green with creamy white bracts.

?**Panax ginseng** C. A. Meyer, Bull. Phys. Math. Acad. Sci. St. Pétersb. 1: 340. 1843.

First described from Manchuria and Korea.

Shih Men, No. 899. In dense fir forests. Fairly common.

Fruit yellowish red.

UMBELLIFERAE

Angelica wulsiniana Wolff, Repert. Sp. Nov. Fedde 27: 334. 1930.

Upper Ch'ia Ch'ing Kou, No. 848 (type). Only one specimen found, on steppe.

Height 60 cm.; flowers greenish yellow, aromatic.

Bupleurum spp.

1. T'ien T'ang Ssu, No. 562. On exposed, dry roadsides. Fairly common.

Height up to 20 cm.; flowers greenish yellow.

2. Lang Tzu T'ang Kou, No. 856. On exposed, dry, grassy foothills. Common.

Height up to 60 cm.; flowers yellow, bracts yellow.

3. Ho Lan Shan, No. 1062. On grasslands. Rare.

Height 20 cm.; flowers green, stamens yellow.

Carum carvi L. Sp. Pl. 263. 1753.

First described from Europe.

Hsin Ch'eng, west of Lanchow, No. 304; Ho Lan Shan, No. 1049. Along moist, clay roadsides.

Height up to 45 cm.; flowers purplish.

Ferula sp.?

Chung Wei, No. 234. On an exposed, bare, clay cliff.

Aromatic herb, 45 cm. high; flowers greenish yellow.

Heracleum barbatum Ledeb. Fl. Alt. 1: 300. 1829.

First described from the Altai Mountains.

San Ta Lai Ssu, No. 729. In pure stands in deep rich soil, on exposed, moist stream banks. Common.

Height up to 1.8 meters; flowers white, aromatic.

Heracleum millefolium Diels, Repert. Sp. Nov. Fedde 2: 65. 1906.

First described from collections of the Filchner Expedition in Tibet.

Ta P'an Shan, No. 660. Along exposed moist roadsides. Fairly common.

Height up to 45 cm.; flowers purplish.

Ligusticum pilgerianum Wolff, Repert. Sp. Nov. Fedde 27: 307. 1930.

First described from Szechwan.

Lang Tzu T'ang Kou, No. 581. In woods. Common.

Height up to 1.5 meters; stems purplish, the whole plant highly aromatic. Valued medicinally.

Pleurospermum kansuense Wolff, Repert. Sp. Nov. Fedde 27: 115. 1929.

Ta P'an Shan, No. 650 (type). In dense, flat tufts on exposed, moist, grassy slopes. Fairly common.

Height 30 cm.; flowers purple, aromatic.

Pleurospermum longicaule Wolff, Repert. Sp. Nov. Fedde 27: 117. 1929.

Upper Ch'ia Ch'ing Kou, No. 878 (type). On steppes. Rare.

Height up to 1 meter; flowers yellowish.

Pleurospermum sp.

Hsi Mi Yai, No. 488. In woods. Common.

Height up to 75 cm.; flowers fragrant, pale yellow or white, the anthers purple.

Tongoloa elata Wolff, Medd. Bot. Trädg. Göteborg 2: 291. 1926, vel aff.

First described from northern Szechwan.

Upper Ch'ia Ch'ing Kou, No. 874. On steppes and in open woods. Common, gregarious.

Height up to 80 cm.; flowers aromatic, white, the anthers purple.

CORNACEAE

Cornus bretschneideri L. Henry, Jardin 13: 309. *figs. 154, 155.* 1899.

First described from Peking.

Shui Mo Kou, near Lien Ch'eng, No. 343. In woods, associated with *Corylus*, *Acer*, *Picea*, and *Betula*.

A treelike shrub, up to 5 meters high; branches and young stems distinctly purple; flowers creamy white, fragrant.

Cornus poliophylla C. Schneid. & Wangerin, Repert. Sp. Nov. Fedde 7: 228. 1909.²⁶

First described from central China.

Lien Hua Shan, No. 1019. In densely shaded woods, associated with *Betula*, *Acer*, *Pinus*, etc. Common.

A small tree, up to 10 meters high, with a trunk diameter of 15 cm.

²⁶ This was determined by A. Rehder. H. Handel-Mazzetti considers this as *C. macrophylla* Wall. in Roxb. Fl. Ind. Ed. Carey 1: 433. 1820 (first described from India).

ERICACEAE

Arctous alpinus (L.) Niedenzu, Bot. Jahrb. Engler 11: 180. 1889.

First described from Europe and Siberia.

La Ch'iung Kou, No. 607. In large patches, on partially shaded slopes of rich soil. Common.

A shrub, up to 1 meter high; fruit green, the pedicel and calyx reddish yellow.

Pyrola rotundifolia L. subsp. *chinensis* Andres, Deutsch. Bot. Monatschr. 22: 35. 1911.

First described from northern China.

Ha La Hu Kou, No. 78; T'u Er P'ing, No. 424; Shih Men, No. 929; Ho Lan Shan, No. 1136. In forests of *Picea* and *Abies* or of *Betula* and *Salix*, on moist soil. Common at higher altitudes.

Height 8 cm.; flowers purplish yellow; fruit of previous year persistent (May). Used locally by lumbermen as tea.

Rhododendron agglutinatum Balf. & Forr. Notes Bot. Gard. Edinburgh 12: 88. 1920.

First described from Szechwan and Yunnan.

Lang Tzu T'ang Kou, No. 578. In moist woods with other species of *Rhododendron*. Common. Ta P'an Shan, No. 670. On exposed, very moist, alpine summits. Common. Upper Ch'ia Ch'ing Kou, No. 868. In *Juniperus* forests or forming pure stands by itself. Common.

A shrub, up to 4.5 meters high; bark of current year's growth yellowish green, becoming gray the second year; leaves brownish beneath; flowers pure white with brown spots inside of corolla.

Rhododendron anthopogonoides Maxim. Bull. Acad. Sci. St. Pétersb. 23: 350. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 9: 772. 1877).

First described from Przhevalski's Kansu collections.

T'ai Hua, No. 525 (rare); La Ch'iung Kou, No. 615 (common). Associated with *R. capitatum* on moist exposed slopes.

A shrub, up to 1.8 meters high, producing suckers freely; flowers greenish, faintly fragrant.

Rhododendron capitatum Maxim. Bull. Acad. Sci. St. Pétersb. 23: 351. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 9: 773. 1877).

First described from Przhevalski's Kansu collections.

T'ai Hua, No. 524; La Ch'iung Kou, No. 603; Ch'ia Ch'ing Kou, Nos. 871, 951. Forming a dense, sometimes almost impenetrable scrub, often of large extent, on exposed, moist slopes at rather high altitudes.

A shrub, up to 1 meter high; leaves abundantly silvery lepidote above, brownish lepidote beneath.

Rhododendron rufum Batalin, Act. Hort. Petrop. 11: 490. 1891.

First described from Szechwan.

Lung Hua, No. 801. Forming a pure dense undergrowth in *Picea* and *Abies* forests. Common.

A shrub, up to 6 meters high; leaves thick brown-tomentose beneath.

Rhododendron thymifolium Maxim. Bull. Acad. Sci. St. Pétersb. 23: 35. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 9: 773. 1877).

First described from Przhevalski's Kansu collections.

T'ai Hua, No. 523 (very rare); La Ch'iung Kou, No. 608 (common). Both associated with *R. capitatum* Maxim. on moist exposed slopes.

A shrub, up to 1.2 meters high; bark brownish gray, smooth; flowers purplish, fragrant.

PRIMULACEAE

Androsace erecta Maxim. Bull. Acad. Sci. St. Pétersb. 27: 499. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 262. 1881).

First described from Przhevalski's Kansu collections.

Shang Hsin Chuang, No. 678. Forming large, round patches on an exposed, moist, clay bank. Common.

Height 15 cm.; flowers pink.

Androsace mariae Kanitz var. *tibetica* (Maxim.) Hand.-Mazz. Medd. Bot. Trädg. Göteborg 2: 114. 1926.

First described from Potanin's and Przhevalski's Tibet, Kansu, and Mongolia collections.

Ha La Hu Kou, No. 55; Shui Mo Kou, Ho Lan Shan, No. 100. In compact patches on exposed, gravelly valley bottoms. Common.

Height up to 12 cm.; flowers pink, fragrant.

Androsace aff. saxifragaefolia Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 127. 1833 (Enum. Pl. China Bor. 53. 1835).

First described from near Peking.

Pei Ssu Kou, No. 118. On grasslands of rich soil, hidden under the grass. Rare.

Flowers pink.

Androsace spp.

1. Ha La Hou Kou, No. 69. On exposed, gravelly valley bottoms. Fairly common.

Cushion plants, 2 to 3 cm. high; flowers pure white with red or yellow disk in center.

2. Upper Ch'ia Ch'ing Kou, No. 863. In rocky crevices. Common.

Cushion plants, 3 to 10 cm. high.

Glaux maritima L. Sp. Pl. 207. 1753.

First described from Europe.

Chung Wei, Nos. 212, 232. At edges of moist cultivated fields of alkaline clay soil. Common, gregarious.

Height 10 cm.; flowers pink or white.

Primula algida Adam, in Web. & Mohr, Beitr. Naturk. 1: 46. 1805.

First described from the Caucasus Mountains.

Ha La Hu Kou, No. 64a; Wang Te Lin Kou, No. 80. In large patches, on exposed, moist, very rich grassland. Fairly common.

Flowers purplish red, fragrant.

Primula gemmifera Batalin, Act. Hort. Petrop. 11: 491. 1891.

First described from Grum-Grzhimailo's Kansu collections.

La Ch'ung Kou, No. 616. On an exposed, moist, grassy slope. Rare. Lung Hua, No. 813. In woods. Common.

Flowers purplish pink.

Primula sataniensis Balf. f. & Farrer, Notes Bot. Gard. Edinburgh 13: 18. 1920.

First described from Farrer's and Purdom's Kansu collection.

Ha La Hu Kou, No. 64; Malisoondo, No. 944 (determination doubtful). Under high bushes and on shaded rocky cliffs. Common.

Flowers purplish red.

Primula stenocalyx Maxim. Bull. Acad. Sci. St. Pétersb. 27: 498. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 260. 1881).

First described from Przhevalski's Kansu collections.

T'ai Hua, No. 549. In woods. Very rare. Ta P'an Shan, No. 659. On roadsides. Fairly common.

Flowers purplish.

Primula urticifolia Maxim. Bull. Acad. Sci. St. Pétersb. 27: 497. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 259. 1881).

First described from Przhevalski's Kansu collections.

Ta P'an Shan, No. 656. On a densely shaded, rocky cliff. Fairly common. Flowers purplish.

Primula woodwardii Balf. f. Notes Bot. Gard. Edinburgh 9: 61. 1915.

First described from plants grown from seeds collected in the northern Peling Mountains, Kansu by Fenwick Owen.

Ch'ia Ch'ing Kou, No. 952. On steppes. Common.

Fruit brown.

PLUMBAGINACEAE

Plumbagella micrantha (Ledeb.) Spach, Hist. Nat. Veg. 10: 333. 1841.

First described from the Altai Mountains.

Lien Ch'eng, No. 312. On grasslands.

Height 45 cm.

Statice aurea L. Sp. Pl. 276. 1753.

First described from Dahuria.

Chung Wei, No. 230; Ho Lan Shan, Nos. 1059, 1075. On exposed, dry, clay cliffs. Common.

Height up to 25 cm.; flowers lemon-yellow, the color persistent.

Statice bicolor Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 129. 1833 (Enum. Pl. China Bor. 55. 1835).

First described from southeastern Mongolia.

Mouth of Hsi Yeh Kou, No. 180; Yao Chieh, No. 249; Ho Lan Shan, No. 1132. On dry, exposed, gravelly slopes and along roadsides. Common.

Height up to 60 cm.; corolla pink or white; calyx violet and open after the corolla is shed.

Statice aff. schrenkiana Fisch. & Mey. Bull. Phys.-Math. Acad. Sci. St. Pétersb. 1: 362. 1843.

First described from Sungaria.

Nan Ssu Kou, No. 134. On a dry, exposed, gravelly ridge. Rare.

Height 17 cm.; flowers yellow.

OLEACEAE

Syringa oblata Lindl. Gard. Chron. 1859: 868. 1859.

First described from a plant in cultivation at Shanghai.

Wang Yeh Fu, No. 38. Growing by itself, on a farm of clay soil. Fairly common.

A shrub, 6 meters high; flowers violet.

Syringa oblata var. *alba* Hort. ex Rehd. in Bailey, Cycl. Amer. Hort. 4: 1763. 1902.

First observed by Bunge in Peking gardens.

Shui Mo Kou, Ho Lan Shan, No. 97. Associated with the next variety, on moist gravelly soil. Only one specimen found.

A shrub, up to 6 meters high; flowers pure white, fragrant; fruit persistent, brown.

Syringa oblata var. *giraldii* (Lemoine) Rehd. Journ. Arn. Arb. 7: 34. 1926.

First described from Shensi.

Ha La Hou Kou, No. 51. On an exposed rocky slope, dominating the landscape at blossoming. Common or very common.

A shrub, up to 6 meters high; flowers pink or violet, fragrant; fruit persistent. The wood of this highly ornamental shrub is used for handles of implements.

Syringa pekinensis Rupr. Bull. Phys. Math. Acad. Sci. St. Pétersb. 15: 371. 1857 (Mél. Biol. Acad. Sci. St. Pétersb. 2: 551. 1858).

First described from Peking.

Tai Wang Kou, No. 446. On exposed, clay soil by a temple. Rare. T'ien T'ang Ssu, No. 560. Cultivated by a lamasery at foot of a hill. Hsin Ch'eng, south of Lanchow, Nos. 1005, 1006. Along partially shaded roadsides. Fairly common.

A tree or large shrub, up to 11 meters high; bark shining brown (similar to that of the red birch), peeling off in long strips; flowers creamy white.

LOGANIACEAE

Buddleia alternifolia Maxim. Bull. Acad. Sci. St. Pétersb. 26: 494. 1880 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 673. 1880).

First described from Piasetski's Kansu collections.

Hsi Yeh Kou, No. 185. On exposed moist foothills. Rather rare.

A shrub, up to 6 meters high, either assuming a bushy form or having a brush of dense branches at the tip of a single stem, the branchlets long, slender, somewhat curving, loaded with a mass of purple flowers.

GENTIANACEAE²⁷

Gentiana chingii Marquand, Kew Bull. Misc. Inf. 1931: 83. 1931.

Yeh T'sang Kou, No. 817 (type). In dense tussocks, on steppes. Very common.

Height up to 20 cm.; flowers blue, the anthers reddish.

Gentiana dahurica Fisch. Mém. Soc. Nat. Moscou 3: 63. 1812.

First described from Dahuria.

T'ai Hua, No. 529. On exposed, dry moist slopes and along clay roadsides. Very common. Ho Lan Shan, No. 1090. On grasslands. Common.

A spreading or somewhat prostrate herb, 18 to 40 cm. high, with a long thick taproot and a compact tuft of leaves, stems, and flowers, flowers deep purple (No. 529) or bluish at mouth of corolla, paler below (No. 1090). Root valued medicinally.

Gentiana farreri Balf. f. Trans. Bot. Soc. (Edinburgh) 27: 248. 1918.

First described from Farrer's and Purdom's Kansu collections.

A Chüan, No. 986. On steppes. Common.

Height 20 cm.; flowers bluish, opening to a width of 3 cm. in sunlight, closing at night.

Gentiana grumii N. I. Kuzen.²⁸ Act. Hort. Petrop. 13: 63. 1893.

First described from Grum-Grzhimailo's Kansu collections in the Nan Shan.

Hsi Mi Yai, No. 499. Beautifully covering the edges of a woods. Common.

Height 10 cm.; flowers purple.

²⁷ All or most of the specimens of this family were sent for determination to Dr. C. V. B. Marquand at Kew, who has cited them from time to time in his published detailed studies. Unfortunately, at the time of his retirement in 1939, these studies with rather important taxonomic changes were far from complete. Therefore, in addition to the full determinations to species, which are Marquand's work, the following incomplete determinations are recorded with doubt even of some of the generic allocations.

²⁸ Determined by E. H. Walker.

Gentiana hexaphylla Maxim. var. **caudata** Marquand, Kew Bull. Misc. Inf. 1931: 81. 1931.

Upper Ch'ia Ch'ing Kou, No. 870 (type). In tussocks on steppes. Common. Height up to 20 cm.; with a very tough root system; flowers blue.

Gentiana leucomelaena Maxim. Bull. Acad. Sci. St. Pétersb. 34: 505. 1892. First described from Mongolia, Tibet, and Kansu.

Yeh Ts'ang Kou, No. 821. On steppes. Fairly common.

Height 18 cm.; flowers white with blue stripes on outside of corolla, dotted inside with small purple spots, closing immediately on being collected

Gentiana officinalis H. Smith, in Hand.-Mazz. Symb. Sin. 7: 979. 1936.

First described from Szechwan and Kansu (Ching's collection).

Ni Ma Lang Kou, No. 753.²⁹ On an exposed, moist, valley bottom of rich loam. Common. Lung Hua, No. 807. On a mountaintop on the margin of an *Abies* forest. Fairly common. Ho Lan Shan, No. 1063. On moist grasslands along a stream. Common.

Height up to 75 cm.; flowers blue above, greenish yellow below, spotted inside with blue.

Gentiana przewalskii Maxim. Bull. Acad. Sci. St. Pétersb. 27: 502. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 266. 1881).

First described from Przhevalski's Kansu collections.

Shih Men, No. 934. In tussocks on steppes. Common.

Height up to 23 cm.; flowers deep blue.

Gentiana siphonantha Maxim. var. **latifolia** Marquand, Kew Bull. Misc. Inf. 1937: 167. 1937.

Lang Tzu T'ang Kou, No. 585 (type). On an exposed, moist foothill. Rare. Height up to 45 cm.; flowers deep turquoise blue.

Gentiana squarrosa Ledeb. Mém. Acad. Sci. St. Pétersb. Hist. Acad. 5: 527. 1815? (1812?).

First described from Transbaikalia.

Ha La Hu Kou, No. 68. On a moist valley bottom of rich soil.

A low herb, about 3 cm. high, with a long taproot; flowers violet.

Gentiana straminea Maxim. Bull. Acad. Sci. St. Pétersb. 27: 502. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 267. 1881).

First described from Przhevalski's Kansu collections.

Shang Hsin Chuang, No. 682. On exposed, moist grasslands or steppes. Common.

A prostrate herb, up to 60 cm. high, the ends of the stems ascending; flowers yellowish green, dotted with many green spots.

Gentiana striata Maxim. Bull. Acad. Acad. Sci. St. Pétersb. 27: 501. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 265. 1881).

First described from Przhevalski's Kansu collections.

Lung Hua, No. 815. On an exposed, moist stream bank. Common.

Height up to 45 cm.; flowers greenish yellow.

Gentiana spp.

1. T'ai Hua, No. 515. Gregarious, on a moist, bushy slope. Common.

Height up to 38 cm.; flowers greenish yellow.

2. A Chüan, No. 976. On steppes. Common.

Height up to 36 cm.; flowers bluish.

²⁹ This number is cited with the original description.

Gentianella spp.

1. T'u Er P'ing, No. 411. In woods and moist, shaded places. Common.
Height 60 cm.; flowers deep violet.
2. La Ch'ung Kou, No. 606. On an exposed, moist, grassy slope. Rare.
Near Labrang, No. 772. In woods, on partially shaded, very moist soil.
Height 30 cm.; flowers deep turquoise blue.
3. Lung Hua, No. 781. In woods, partially shaded. Common.
Height up to 30 cm.; flowers pure white inside, greenish yellow outside.
4. Upper Ch'ia Ch'ing Kou, No. 888. On a rocky cliff. Only one clump found.
Height 5 cm.; flowers bluish purple.
5. Ch'ia Ch'ing Kou, No. 953. On steppes at the foot of a bare rocky ridge.
Rare.
Height 18 cm.; flowers bluish.
6. Ho Lan Shan, No. 1122. Decorating the grasslands. Common.
Height 18 cm.; flowers purplish blue.
7. Ho Lan Shan, No. 1125. On steppes.
Height 18 cm.; flowers bluish.
8. Ho Lan Shan, No. 1126. At edge of forests.
Height 25 cm.; flowers blue.

Halenia elliptica D. Don, Trans. Linn. Soc. 27: 525. 1837.

First described from India.

Shih Men, No. 925; Ho Lan Shan, No. 1124. On steppes and in open woods.
Common.

Height about 40 cm.; stems purple; flowers purplish or blue.

Swertia pusilla Diels, Notizbl. Bot. Gart. Berlin 11: 215. 1931.

Ha La Hu Kou, No. 70 (type). In rich soil on moist valley bottoms. Fairly common.

Height 5 cm.; flowers white, slightly tinged with purple; young leaves and petioles tinged with purple.

Swertia spp.

1. La Chi Tzu Shan, No. 706. On partially shaded, very moist steppes.
Common.
Height 25 cm.; flowers turquoise blue.
2. Lung Hua, No. 792. In forest. Rare.
Height up to 60 cm.; flowers greenish yellow, dotted with purple spots.
3. Yeh Ts'ang Kou, No. 816. On steppes. Rare.
Height up to 25 cm.; flowers deep purplish blue.
4. Upper Ch'ia Ch'ing Kou, No. 860. Beautifully dotting steppes and bushy slopes. Common.
Height up to 30 cm.; flowers purplish blue with deeper lines on petals.

APOCYNACEAE

Trachomitum venetum (L.) Woodson, Ann. Missouri Bot. Gard. 17: 158. 1930.

First described from southern Europe.

Chung Wei, No. 235. On edges of cultivated fields.

Flowers purplish.

ASCLEPIADACEAE

Cynanchum chinense R. Br. Mem. Wern. Soc. 1: 44. 1809 (?).

First described from Hopeh.

Chung Wei, No. 221. Along roadsides, in alkaline, alluvial soil.

A climbing or prostrate herb, with milky juice; flowers white.

Cynanchum mongolicum (Maxim.) Hemsl. Journ. Linn. Soc. Bot. 26: 107. 1889.

First described from plants grown from seeds sent from the Ordos Desert in Mongolia.

Hsin Ch'eng, No. 214; Yao Chieh, No. 252. On a bare, dry, gravelly foothill. Flowers greenish yellow to deep purple. Hardy and drought-resistant.

Cynanchum sibiricum R. Br. Mem. Wern. Soc. 1: 48. 1809 (?).

First described from Siberia and China.

Huang Hsi Kou, No. 195 (common); Hsün Hua Hsien, No. 735 (rare). In dry, exposed places.

Flowers yellowish, very fragrant.

CUSCUTACEAE

Cuscuta chinensis Lam. Encycl. 2: 229. 1786.

First described from China.

La Chi Tzu Shan, No. 715 (host not identifiable); Tu I Kou, No. 967a (on *Sambucus wrightiana* Wall.)

CONVOLVULACEAE

Convolvulus arvensis L. Sp. Pl. 153. 1753.

First described from Europe.

Hsi Yeh Kou, No. 171. On moist farm clay. Common.

Height 60 cm.; flowers pink, fragrant.

Convolvulus tragacanthoides Turcz. Bull. Soc. Nat. Moscou 5: 201. 1832.

First described from Mongolia.

Ha La Hu Kou, No. 47; Wang Yeh Fu, No. 127. On exposed, gravelly foothills and along roadsides in desert. Common.

In compact clusters up to 10 cm. high; flowers pink.

POLEMONIACEAE

Polemonium caeruleum L. subsp. *villosum* (Rudolph) Brand in Engl.

Pflanzenreich 27 (IV. 250): 38. 1907.

First described from Siberia.

T'u Er P'ing, No. 414. In a large patch in woods. Common.

Height up to 90 cm., flowers deep blue.

BORAGINACEAE

Arnebia szechenyii Kanitz in Széchenyi, Keletáz. Utjának 2: 828. 1891 (Kanitz, Pl. Exped. Széch. Asia Centr. 42. pl. 5. 1891).

First described from Loczy's Kansu collections.

Five li east of Hsün Hua Hsien, No. 731. On an exposed, dry, bare slope. Fairly common.

Flowers yellow, with 5 black spots on some flowers.

Asperugo procumbens L. Sp. Pl. 138. 1753.

First described from Europe.

Lien Ch'eng, No. 313; Ho Lan Shan, No. 1101. In cultivated fields or woods.

A procumbent herb; flowers bluish.

Eritrichium pectinatum DC. Prodr. 10: 127. 1830.

First described from Dahuria.

Ho Lan Shan, No. 1095. On dry, exposed, bare slopes or cliffs. Common.

Flowers blue.

Lappula redowakii (Hornem.) Greene, *Pittonia* 2: 182. 1891.

First described from Europe.

Pei Ssu Kou, No. 187; Ho Lan Shan, No. 1111. In woods or on fairly moist, exposed farmland. Common.

Flowers blue.

Lycopsis orientalis L. Sp. Pl. 137. 1753.

First described from "Oriente."

Hsi Yeh Kou, No. 177; Ho Lan Shan, No. 1057. On exposed banks of a ditch and in *Picea* forests. Common.

Flowers blue.

Messerschmidtia siberica L. Mant. Pl. 2: 334. 1771.

First described from Dahuria.

Chung Wei, No. 213. In cultivated fields of moist alkaline soil. Common.

Height 20 cm.; flowers yellow.

Microula myosotidea (Franch.) I. M. Johnston, *Contr. Gray Herb.* 73: 62. 1924.

First described from Yunnan.

Liu Fu Yai, No. 474. On moist grasslands. Common.

Flowers shining blue.

Microula trichocarpa (Maxim.) I. M. Johnston, *Contr. Gray Herb.* 81: 83. 1928.

First described from Przhevalski's Kansu collections.

Shih Men, No. 919. On steppes. Common.

VERBENACEAE

Caryopteris mongholica Bunge, *Pl. Mong.-Chin.* 28. 1835.

First described from Mongolia.

Ho Lan Shan, No. 1086. On an exposed, dry, clay cliff. Fairly common.

Height 30 cm.; flowers shining blue, fragrant.

Caryopteris tangutica Maxim. *Bull. Acad. Sci. St. Pétersb.* 11: 301. 1881.

First described from Przhevalski's Kansu collections.

T'ien T'ang Ssu, No. 564. On an exposed, gravelly river bank. Common.

Flowers deep purple, aromatic.

LABIATAE

Ajuga lupulina Maxim. *Bull. Acad. Sci. St. Pétersb.* 23: 391. 1877 (M61.

Biol. Acad. Sci. St. Pétersb. 9: 831. 1877).

First described from Przhevalski's Kansu collections.

Ta P'an Shan, No. 643. On moist, grassy slopes. Very common.

Flowers white with many blue stripes.

Ajuga ovalifolia Bur. & Franch. *Journ. de Bot.* 5: 150. 1891.

First described from Szechwan.

Upper Ch'ia Ch'ing Kou, No. 851. In dense woods. Only one specimen found.

Flowers purplish blue.

Dracocephalum heterophyllum Benth. *Labiata. Gen. Sp.* 738. 1835.

First described from eastern India.

Lien Ch'eng No. 305. On a moist, exposed, sandy beach.

Flowers creamy white, fragrant.

Dracocephalum imberbe Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 560. 1835.

First described from the Altai Mountains.

Lang Tzu T'ang Kou, No. 590. In dense tussocks, on an exposed, moist, gravelly foothill. Common.

Flowers deep purple.

Dracocephalum sibiricum L. Syst. Nat. ed. 10, 1104. 1759.

First described from Dahuria.

Upper Shui Mo Kou, near Lien Ch'eng, No. 384. On a shrub-covered slope. Height 60 cm.; flowers purplish blue.

Dracocephalum tanguticum Maxim. Bull. Acad. Sci. St. Pétersb. 27: 530. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 307. 1880).

First described from Przhevalski's Kansu collections.

T'ai Hua, No. 535. On an exposed, dry roadside of hard clay. Common.

Flowers purple.

Elsholtzia cristata Willd. in Roem. & Ust. Mag. Bot. 5¹¹: 5. 1790.

First described without locality.

A Chüan, No. 978. On an exposed, moist roadside. Rare.

Flowers purplish, fragrant.

Elsholtzia densa Benth. Labiat. Gen. Sp. 714. 1835.

First described from India.

Ho Lan Shan, No. 1142. In a dense stand, on edges of cultivated field. Common.

Flowers purplish.

Elsholtzia eriostachya Benth. Labiat. Gen. Sp. 163. 1833.

First described from India.

Lung Hua, No. 788. In a pure stand, along exposed, very moist roadsides of rich soil. Common.

Flowers purple, aromatic. Used medicinally.

Galeopsis tetrahit L. Sp. Pl. 579. 1753.

First described from Europe.

La Ch'üung Kou, No. 629. Forming dense, pure stands on exposed, grassy slopes. Common.

Height 18 cm.; flowers yellowish, the lower lip tinted with purple.

Lamium amplexicaule L. Sp. Pl. 579. 1753.

First described from Europe.

La Chi Tzu Shan, No. 720. In an exposed yard of rich, clay soil. Common.

Height up to 60 cm.; flowers purple.

Leonurus lanatus (L.) Pers. Syn. Pl. 126. 1805.

First described from Siberia.

Ningsia, No. 224; Ho Lan Shan, No. 1105. Scattered, on dry, exposed, sandy soil.

Flowers creamy white, fragrant.

Leonurus sibiricus L. Sp. Pl. 584. 1753.

First described from Siberia and China.

Hsün Hua Hsien, No. 732. On exposed, fairly moist foothills or along roadsides. Common.

Flowers purplish, aromatic.

Marrubium incisum Benth. Labiat. Gen. Sp. 586. 1834.

First described from Siberia, Dahuria, and northern China.

Pei Ssu Kou, No. 189. In large patches in dry or moist exposed places. Common. Shang Hsin Chuang, No. 677. Growing in tufts with some prostrate stems, along exposed roadsides. Rare.

Height 25 cm.; flowers purple or white, aromatic.

Mentha arvensis L. Sp. Pl. 577. 1753.

First described from Europe.

Shang Hsin Chuang, No. 684: Ho Lan Shan, No. 1099. Along roadsides and ditches, or on rather swampy land. Common.

Flowers white or pink. Valued medicinally.

Nepeta macrantha Fisch. Cat. Jard. Gorenk. ed. 2, 22. 1812 (*nomen nudum*); Benth. Labiat. Gen. Sp. 482. 1834.

First described from the Altai Mountains.

Ho Lan Shan, No. 1128. At edge of woods. Common.

Flowers blue.

Phlomis mongolica Turcz. Bull. Soc. Nat. Moscou 24²: 406. 1851 (Fl. Baical. 2: 434. 1856).

First described from Mongolia.

Huang Hsi Kou, No. 197. On bottom of an exposed, moist, rocky gorge. Common. Chung Wei, No. 231. On an exposed, bare, gravelly slope.

Height 30 cm.; flowers purplish.

Salvia przewalskii Maxim. Bull. Acad. Sci. St. Pétersb. 27: 526. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 301. 1881).

First described from Przhevalski's Kansu collections.

Shui Mo Kou, near Lien Ch'eng, No. 355. On an exposed, wet stream bank.

Flowers bluish purple.

Salvia roborowskii Maxim. Bull. Acad. Sci. St. Pétersb. 27: 527. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 302. 1881).

First described from Przhevalski's Kansu collections.

Ni Ma Lang Kou, No. 759. Along exposed, very moist roadsides of black, rich soil. Common.

Flowers greenish yellow, pleasantly aromatic.

Scutellaria baikalensis Georgi, Reise Russ. Reich. 1: 223. 1775.

First described from the Baikal region.

Nan Ssu Kou, No. 138. In dry, mountain stream beds.

Height 25 cm.; flowers violet. Fairly common.

Scutellaria rivularis Wall. List No. 2140. 1829 (*nomen nudum*); Pl. Asiat. Rar. 1: 66. 1830.

First described from Nepal.

Ho Lan Shan, No. 1154. On exposed, dry, clay cliffs.

Height 30 cm.; flowers blue.

Stachys baikalensis Fisch. in Benth. Labiat. Gen. Sp. 543. 1834, vel. aff.

First described from Dahuria and Siberia.

Yao Chieh, No. 270. On margins of cultivated fields. Lung Hua, No. 787. Forming dense patches, along exposed, very moist roadsides of rich soil. Common.

Height up to 60 cm.; flowers creamy white to purplish blue, the whole plant aromatic. Used medicinally.

Thymus serpyllum L. subsp. **mongolicus** Ronniger, Notizbl. Bot. Gart. Berlin 10: 890. 1930.

First described from Kansu (Rock's collections), Tibet, the Altai Mountains, etc.

Labrang, No. 780; Ho Lan Shan, No. 1138. In dense *Picea* forests. Common.

A low herb, spreading by runners; flowers purple.

SOLANACEAE

Anisodus tanguticus (Maxim.) Pascher, Repert. Sp. Nov. Fedde 7: 167. 1909.

First described from Przhevalski's Kansu collections.

Liu Fu Yai, No. 469; La Ch'iung Kou, No. 600. On exposed, moist foothills or along roadsides. Common.

A large, bushy herb, up to 1.2 meters high; flowers deep purple; fruit enclosed in a green, corrugated involucre. Used medicinally.

Hyoscyamus niger L. Sp. Pl. 179. 1753.

First described from Europe.

Pei Ssu Kou, No. 121; Yao Chieh, No. 275; Ho Lan Shan, No. 1102. Along roadsides or in other open places. Common.

Flowers pale brownish with a network of purple lines; anthers deep red.

Lycium chinense Mill. Gard. Dict. ed. 8, No. 5. 1768.

First described from China.

Hsin Ch'eng, north of Ningsia, No. 208.³⁰ On exposed, hard, clay cliffs in eastern and northeastern Kansu. Common.

A shrub, up to 2.5 meters high; flowers purple; fruit red. Cultivated for its medicinally very valuable fruits, these gathered also from wild plants.

Solanum nigrum L. Sp. Pl. 186. 1753.

First described from cultivation.

Lien Ch'eng, No. 299. Along moist edges of cultivated fields.

Flowers yellowish; fruit green.

Solanum septemlobum Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 122. 1833 (Enum. Pl. China Bor. 48. 1835).

First described from near Peking.

Hsi Yeh Kou, No. 172; Ho Lan Shan, No. 1104. Along moist roadsides, often in thickets. Common.

Flowers deep violet.

SCROPHULARIACEAE

Cymbaria mongolica Maxim. Mém. Acad. Sci. St. Pétersb. VII. 29³: 66. 1881.

First described from Przhevalski's Mongolia and Kansu collections.

Nan Ssu Kou, No. 131. On moist, rich grasslands and in dry places. Very common.

Height 5 cm.; flowers brownish red without, yellowish green within, fragrant.

Euphrasia officinalis L. Sp. Pl. 604. 1753.

First described from Europe.

Ho Lan Shan, No. 1083. Along the shaded margins of streams.

Height 20 cm.; flowers purplish.

Euphrasia tatarica Fisch. in Spreng. Syst. Veg. 2: 777. 1825.

First described from Siberia.

Hsi Mi Yai, No. 486. Along shaded streams. Common.

Flowers faintly purplish; anthers dark purple.

Lancea tibetica Hook. f. & Thoms. Journ. Bot. Kew Misc. 9: 244. pl. 7. 1857.

First described from alpine Tibet.

Liu Fu Yai, No. 472. Rare. Lung Hua, No. 812. Many growing together on exposed, moist, valley bottoms. Common.

Height 8 cm.; flowers deep violet; fruit shining purple, immature (August).

Odontites rubra Pers. Syn. Pl. 2: 150. 1807.

First described from Europe.

³⁰ This specimen has been reported by Handel-Mazzetti as possibly a new species.

Hsün Hua Hsien, No. 734; Ho Lan Shan, No. 1143. Along exposed, wet, clay roadside and irrigation ditches. Common.

Height 30 cm.; flowers purple.

Pedicularis alaschanica Maxim. Bull. Acad. Sci. St. Pétersb. 24: 59. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 91. 1878).

First described from Przhevalski's Mongolia and Kansu collections.

Lien Ch'eng, No. 365. On sandy and gravelly beaches. Ho Lan Shan, No. 1081. In *Picea* forests. Common.

Flowers yellowish.

Pedicularis anas Maxim. Bull. Acad. Sci. St. Pétersb. 32: 578. 1888 (Mél. Biol. Acad. Sci. St. Pétersb. 12: 860. 1886).

First described from Szechwan.

Ta P'an Shan, No. 645. On exposed, moist, grassy slopes. Very common.

Flowers purplish, showy.

Pedicularis armata Maxim. Bull. Acad. Sci. St. Pétersb. 24: 56. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 86. 1878).

First described from Przhevalski's Kansu collections.

Hsi Mi Yai, No. 460. In large dense patches by shady streams in gorges. Very common.

Flowers yellow, fragrant.

Pedicularis chingii Bonati, Arch. Bot. (Caen) Bull. 1: 4. 1927.

Ni Ma Lang Kou, No. 761 (type). In woods. Rare.

Flowers purple.

Pedicularis kansuensis Maxim. Bull. Acad. Sci. St. Pétersb. 27: 516. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 287. 1881).

First described from Przhevalski's Kansu collections.

Yao Chieh, No. 280. Along moist roadsides.

Flowers purplish.

Pedicularis muscicola Maxim. Bull. Acad. Sci. St. Pétersb. 24: 54. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 84. 1878).

First described from Przhevalski's Kansu and Mongolia collections.

T'u Er P'ing, No. 423; Ho Lan Shan, No. 1129. In dense, wet woods and on swampy grasslands. Common.

A tufted herb; flowers purplish.

Pedicularis rhinanthoides Schrenk in Fisch. & C. A. Meyer, Enum. Pl. Nov. Schrenk 1: 22. 1841.

First described from the Altai Mountains.

Liu Fu Yai, No. 471. On moist grasslands. Common. Lang Tzu T'ang Kou, No. 580. In dense, shaded woods. Rare.

Flowers purple, fragrant.

Pedicularis rudis Maxim. Bull. Acad. Sci. St. Pétersb. 24: 67. 1877 (Mél. Biol. Acad. St. Pétersb. 10: 102. 1878).

First described from Przhevalski's Mongolia and Kansu collections.

Ch'ing Kang Yai, No. 568. In woods. Common.

A very tall form, up to 1 meter high; flowers yellow.

Pedicularis striata Pall. Reise Prov. Russ. Reich. 3: 737. *pl. R.* 1776.

First described from Dahuria.

Ho Lan Shan, No. 1066. On steppes. Common.

Flowers greenish yellow.

Pedicularis torta Maxim. Bull. Acad. Sci. St. Pétersb. **32**: 538. 1888 (Mél. Biol. Acad. Sci. St. Pétersb. **12**: 801. 1886).

First described from Potanin's Kansu collections.

Lung Hua, No. 784. In dense patches in woods and other shady places. Common.

Flowers yellow, the beak purplish.

Pedicularis spp.

1. T'ai Hua, No. 514. In tufts, on moist bushy slopes. Common.

Height 23 cm.; flowers yellow.

2. Ni Ma Lang Kou, No. 743. On exposed, moist steppes. Common.

Height up to 25 cm.; flowers creamy white, very showy.

Behmannia glutinosa Libosch. in DC. Prodr. **9**: 275. 1845.

First described from China.

Mouth of Hsi Yeh Kou, No. 174. Along exposed, moist, rocky banks of irrigation ditches. Common.

Height 20 cm.; flowers purple, lined within, fragrant.

Scrofella chinensis Maxim. Bull. Acad. Sci. St. Pétersb. **32**: 511. 1888 (Mél. Biol. Acad. Sci. St. Pétersb. **12**: 763. 1886).

First described from Szechwan.

Lung Hua, No. 782. In *Picea* and *Abies* forests. Common.

Height up to 50 cm.; flowers greenish yellow; fruit deep blue (immature).

Scrophularia alaschanica Batalin, Act. Hort. Petrop. **13**: 380. 1894.

First described from Przhevalski's Mongolia collections.

Ha La Hu Kou, No. 76. At foot of large rocks, partially shaded.

Flowers greenish yellow.

Scrophularia delavayi Franch. Bull. Soc. Bot. France **47**: 15. 1900.

First described from Yunnan.

Ho Lan Shan, No. 1149. On moist, gravelly valley bottoms.

Height 30 cm.; flowers greenish yellow.

Scrophularia incisa Weinm. Bot. Gart. Univ. Dorpat 1810. 136. 1810.

First described from Siberia.

Shui Mo Kou, near Lien Ch'eng, No. 364. On exposed, moist foothills of sandy soil.

Height 80 cm.; flowers violet.

Veronica anagallis L. Sp. Pl. 12. 1753.

First described from Europe.

Hsi Mi Yai, No. 483. Along shaded stream banks. Common.

Height 30 cm.; flowers purplish.

Veronica ciliata Fisch. Mém. Soc. Nat. Moscou **3**: 56. pl. 9. 1812.

First described from Siberia.

Ta P'an Shan, No. 646. On exposed, moist, grassy slopes. Common.

Height 18 cm.; flowers purple.

Veronica tournefortii K. Gmel. Fl. Badens. **1**: 139. 1805.

First described from Europe.

La Ch'iung Kou, No. 628. On partially shaded, moist, grassy slopes. Common.

Height up to 1.2 meters; flowers pink.

Veronica sp.

Lung Hua, No. 811. In forests. Fairly common.

Height up to 45 cm.; flowers purplish blue.

OROBANCHACEAE

Boschniakia sp.

A Chüan, No. 977. In an open *Abies* forest. Rare.

Height 38 cm.; fruit brownish.

†Orobanche ammophila C. A. Meyer,³¹ in Ledeb. Fl. Alt. 2: 454. 1830.

First described from the Altai Mountains.

Shui Mo Kou, near Lien Ch'eng, No. 371. In woods. Rare.

Flowers bluish white.

Phelipaea salsa C. A. Meyer³² in Ledeb. Fl. Alt. 2: 461. 1830; Icon. Pl. Ross. 4: 21. pl. 37b. 1833.

First described from the Altai Mountains.

Chia Ku K'ou, No. 24. On slopes of moving sand dunes.

An herbaceous root-parasite on *Arthrophytum arborescens* Litvinov, the stems up to 30 cm. high, completely underground except the upper 1 cm., the upper half white, the lower more creamy, tender, branching into 2 to 6 shoots from the long slender roots, but such occurring only where most abundant; blooming under almost any conditions as long as the basal storage tissue and the flowering parts are not severed; flowers fragrant, the sepals white, the petals purplish with two bright yellow ridges on the inside. This herb is reported to be one of the most valuable Chinese medicines. It is also made into a delicious dish, either fresh or salted.

BIGNONIACEAE

Incarvillea compacta Maxim. Bull. Acad. Sci. St. Pétersb. 27: 521. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 294. 1881).

First described from Przhevalski's Kansu collections.

Ni Ma Lang Kou, No. 766. On exposed, moist steppes. Common.

Flowers rosy red; anthers white.

Incarvillea sinensis Lam. Encycl. 3: 243. 1789.

First described from near Peking.

Lien Ch'eng, No. 288. On edges of moist cultivated fields. Rare.

Height 60 cm.; flowers purple.

Incarvillea variabilis Batalin, Act. Hort. Petrop. 12: 177. 1892.

First described from Potanin's Kansu collections.

Shui Mo Kou, near Lien Ch'eng, No. 324. On grassy foothills. Rare.

Height 50 cm.; flowers greenish yellow.

PLANTAGINACEAE

Plantago depressa Willd. Hort. Berol. Suppl. 8. 1813.

First described from cultivation.

Nan Ssu Kou, No. 152; Ningsia, No. 291. On moist stream banks. Common.

Plantago lessingii Fisch. & Mey. Ind. Sem. Hort. Bot. Petrop. 2: 22. 1835.

First described from Mongolia.

Pei Ssu Kou, No. 113. Along the foot of a wall on a farm of clay soil. Common.

Flowers green.

³¹ This is W. E. Evans' determination. In G. Beck von Mannagetta's treatment in Das Pflanzenreich, this name is placed as a synonym of *O. coerulescens* var. *typica* G. Beck.

³² This species is considered as *Cistanche salsa* (C. A. Meyer) G. Beck, in Engl. & Prantl. Pflanzenfam. 4th: 129. 1895.

Plantago major L. Sp. Pl. 112. 1753.

First described from Europe.

Cho Ni, No. 1000. On an exposed, very moist roadside. Common.

An especially large form, up to 75 cm. high.

RUBIACEAE

Galium boreale L. Sp. Pl. 108. 1753.

First described from northern Europe.

T'u Er P'ing, No. 399; Lien Ch'eng, No. 350. In woods or on bushy slopes.

Height 60 cm.; flowers purplish blue or white, highly fragrant.

Galium verum L. Sp. Pl. 107. 1753.

First described from Europe.

Yao Chieh, No. 264. On dry, bare, clay cliffs.

Height 60 cm.; inflorescence very showy; yellow.

Leptodermis sp.

Ho Lan Shan, No. 203. On exposed, dry, gravelly valley bottoms. Common.

A stunted shrub; flowers purplish.

Rubia cordifolia L. Mant. Pl. 197. 1757.

First described from Siberia and China.

Shui Mo Kou, near Lien Ch'eng, No. 311; T'ai Hua, No. 551; Ho Lan Shan, No. 1096. In woods. Common.

Height up to 1.2 meters; flowers greenish yellow.

CAPRIFOLIACEAE

Abelia zanderi (Graebn.) Rehd. in Sarg. Pl. Wils. 1: 121. 1911.

First described from western Szechwan and Tibet.

Shih Men, No. 897. In woods and on exposed slopes. Very common.

A dense shrub, up to 4 meters high; stems drooping, gray, with 6 ridges. Highly ornamental.

Lonicera caerulea L. Sp. Pl. 174. 1753.

First described from Europe. T'u Er P'ing, No. 417. In woods. Very common.

A dense shrub, up to 3 meters high, the bark peeling off in long strips, exposing a brown inner layer; fruit black, glaucous, acidic. Valued for its edible fruits.

Lonicera chrysantha Turcz. Bull. Soc. Nat. Moscou 11¹: 93. 1838 (*nomen nudum*); 18¹: 304. 1845 (Fl. Baical. 1: 522. 1845).

First described from Dahuria.

Shui Mo Kou, near Lien Ch'eng, No. 340; Tai Wang Kou, No. 442; Ch'ia Ch'ing Kou, No. 834. In woods. Common.

A dense shrub, up to 3 meters high; flowers creamy white, fragrant.

Lonicera ferdinandi Franch. Nouv. Arch. Mus. Hist. Nat. (Paris) II. 6: 31. pl. 12. 1883 (Pl. David. 1: 151. pl. 12. 1884).

First described from Mongolia.

Ch'ia Ch'ing Kou, No. 826. On dry, exposed, hard, clay slopes. Common.

A dense shrub, up to 2 meters high; fruit purplish green (immature).

Lonicera heteroloba Batalin, Act. Hort. Petrop. 12: 174. 1892.

First described from Potanin's Kansu collections.

Lung Hua, Nos. 793, 802; Cho Ni, No. 996. In dense forests of *Picea* and *Abies*, and on exposed, bushy slopes. Common.

A dense shrub, 2 to 6 meters high, the bark gray, stripping off in long narrow flakes; fruit deep red. A very ornamental species when the fruits are fully ripe.

Lonicera hispida Pall. in Roem. & Schult. Syst. Veg. 5: 258. 1819.

First described from the Altai Mountains.

T'u Er P'ing, No. 410. In woods. Rare. Malisoondo, No. 882. Along exposed roadsides. Common.

A shrub, up to 2 meters high; branchlets and winter buds purple; fruit red, partially enclosed by a pair of thin, gray bracts.

Lonicera inconspicua Batalin, Act. Hort. Petrop. 14: 172. 1895, vel. aff.

First described from Tibet.

T'u Er P'ing, No. 369. In *Picea* and *Salix* woods. Common.

A low, dense shrub, 2 meters high, with a rounded crown; flowers creamy white, very fragrant.

Lonicera microphylla Willd. in Roem. & Schult. Syst. Veg. 5: 258. 1819.

First described from eastern Siberia.

Ha La Hu Kou, No. 50. In rocky valleys. Fairly common.

A many-stemmed shrub, 3 meters high; flowers yellowish, fragrant.

Lonicera microphylla var. *gracilior* Ledeb. Fl. Alt. 1: 249. 1829.

First described from the Altai Mountains.

Hsi Yeh Kou, No. 163. In exposed, rocky and gravelly valley bottoms. Rare.

A shrub, 1.5 meters high; flowers pale yellow, fragrant.

Lonicera nervosa Maxim. Bull. Acad. Sci. St. Pétersb. 24: 39. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 62. 1878).

First described from Przhevalski's Kansu collections.

San Ta Lai Ssu, No. 727; Lung Hua, No. 795. In *Picea* and *Abies* forests. Common.

A shrub, up to 5 meters high; the branchlets purplish; leaves dark green above, paler beneath; fruit deep purple to black.

Lonicera syringantha Maxim. Bull. Acad. Sci. St. Pétersb. 23: 49. 1877 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 77. 1878).

First described from Przhevalski's Kansu collections.

T'u Er P'ing, No. 402; Liu Fu Yai, No. 458; San Ta Lai Ssu, No. 725. Along moist, wooded roadsides, sometimes isolated or with other low shrubs as *Berberis*, *Potentilla fruticosa*, etc. Fairly common.

Height 2 meters; flowers at first pink, later the petals becoming white but the corolla tube remaining pink or purplish, fragrant; fruit red. Very ornamental.

Lonicera tangutica Maxim. Bull. Acad. Sci. St. Pétersb. 24: 48. 1878 (Mél. Biol. Acad. Sci. St. Pétersb. 10: 75. 1878).

First described from Przhevalski's Kansu collections.

T'u Er P'ing, No. 404. In very densely shaded and very moist, wooded regions. Occasional.

A shrub, 2 meters high; flowers pink, fragrant.

Lonicera thibetica Bur. & Franch. Journ. de Bot. 5: 48. 1891.

First described from Tibet.

Upper Ch'ia Ch'ing Kou, No. 879. On exposed, moist slopes of loose clay and debris. Common.

A shrub, up to 60 cm. high, the stems spreading underground; branches prostrate, covering a considerable area; fruit red.

Lonicera trichosantha Bur. & Franch. Journ. de Bot. 5: 48. 1891.

First described from Tibet and Szechwan.

Ni Ma Lang Kou, No. 754. In woods and on exposed slopes. Common.

A shrub, up to 1.2 meters high; fruit bright red, sweet. Very ornamental, especially because of its abundant fruits.

Sambucus adnata Wall. in DC. Prodr. 4: 322. 1830.

First described from Nepal.

Yao Chieh, No. 259. In moist, shaded depressions in clay soil, conspicuous at a distance. Common, many occurring together.

Herbaceous; flowers creamy white, fragrant.

Sambucus wightiana Wall. List No. 6303. 1832 (*nomen nudum*); Wight & Arn.

Prodr. Fl. Ind. Orient. 1: 338. 1834.

First described from India.

Middle Tu I Kou, No. 967. Forming pure, dense stands of large extent on bushy foothills. Common.

A subherbaceous shrub, up to 1.5 meters high; fruit bright red.

Triosteum hirsutum Roxb. Fl. Ind. Ed. Carey 2: 180. 1824.

First described from India.

Upper Shui Mo Kou, near Lien Ch'eng, No. 386. In woods.

Height 50 cm.; flowers white.

Viburnum fragrans Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 107. 1833 (Enum. Pl. China Bor. 33. 1835).

First described from cultivation in Peking.

Wang Yeh Fu, No. 41. Cultivated in partially shaded gardens along with other flowering shrubs. Fairly common.

Height up to 4 meters; flowers white, very fragrant; peduncles reddish. Highly ornamental because of its foliage and flowers.

Viburnum lobophyllum Graebn. Bot. Jahrb. Engler 29: 589. 1901.

First described from Shensi (?).

Lien Hua Shan, No. 1024. In a *Betula*, *Pinus*, and *Acer* woods, on northern slopes. Common.

A shrub, up to 6 meters high; fruit red.

Viburnum mongolicum (Pall.) Rehd. in Sarg. Trees & Shrubs 2: 111. 1908.

First described from Mongolia.

Nan Ssu Kou, No. 146; Ch'ing Kang Yai, No. 569. Along dry, exposed stream banks and in dense woods. Common.

A shrub, 2 meters high; stems gray, smooth; leaves dark green above, pale and with dirty brownish glands beneath; flowers greenish. One of the earliest flowering species of *Viburnum*.

Viburnum opulus L. Sp. Pl. 268. 1753.

First described from Europe.

Lien Hua Shan, No. 1034. Associated with *Crataegus*, *Salix*, and *Malus* at edge of woods. Fairly common.

Fruit bright red.

Viburnum veitchii C. H. Wright, Gard. Chron. III. 33: 257. 1903.

First described from western China.

Ch'ia Ch'ing Kou, No. 1157. On bushy slopes. Rare.

A shrub, up to 1.5 meters high; fruit deep red.

VALERIANACEAE

Patrinia rupestris (Pall.) Dufresne,³³ Hist. Nat. Med. Valérian. 54. 1811.

First described from Siberia.

Ch'ia Ch'ing Kou, No. 840. On partially shaded slopes. Fairly common.

An herb, up to 60 cm. high, often prostrate; flowers lemon-yellow, fragrant.

Valeriana officinalis L. Sp. Pl. 31. 1753.

First described from Europe.

La Chi Tzu Shan, No. 718. Scattered on exposed, moist grasslands. Common.

Height up to 1 meter; flowers purplish, fragrant.

Valeriana tangutica Batalin, Act. Hort. Petrop. 13: 375. 1894.

First described from Przhevalski's and Potanin's Kansu collections.

Nan Ssu Kou, No. 145. On rich soil, on moist, shaded stream banks. Fairly common. La Ch'iung Kou, No. 621; Ho Lan Shan, No. 1051. On shaded, rocky cliffs, and in *Picea* forests. Rare or scattered.

Flowers purplish, fragrant.

Valeriana sp.

T'u Er P'ing, No. 421. In woods. Common.

Height up to 75 cm.; flowers purplish.

DIPSACACEAE

Dipsacus asper Wall. List No. 428. 1829 (*nomen nudum*); DC. Prodr. 4: 646. 1830.

First described from eastern India.

Shih Men, No. 894. Along exposed, fairly moist roadsides. Common.

Height up to 1.3 meters; flowers purplish.

Morina alba Hand.-Mazz. Anzeig. Akad. Wiss. Wien Math.-Naturw. Kl. 62: 68. 1925.

First described from Yunnan.

T'ien T'ang Ssu, No. 561.³⁴ On hard clay, along exposed, dry roadsides. Common.

Flowers creamy white, very fragrant.

Morina chinensis (Batal.) Pai, Repert. Sp. Nov. Fedde 44: 122. 1938.

T'ai Hua, No. 539.³⁴ On exposed, dry, clay mountaintops. Common.

Height up to 45 cm.

³³ The nomenclature of this species is somewhat confused. Index Kewensis erroneously attributes this name to Jussieu, Ann. Mus. Hist. Nat. (Paris) 10: 311. 1807. Although Jussieu there established the genus *Patrinia*, based on *Fedia*, he failed to make the transfer of *F. rupestris* Vahl, based on *Valeriana rupestris* Pall. (which he erroneously cited as on p. 215 rather than p. 266 of "Pall. It.," vol. 3, which is Pall. Reise Prov. Russ. Reich., vol. 3, 1776). The transfer seems to have been first made in 1811 by Dufresne, who cited *Fedia rupestris* Vahl rather than *Valeriana rupestris* Pall.

³⁴ These two specimens of *Morina* were cited in Yin-yüan Pai's revision of the Chinese species in Repert. Sp. Nov. Fedde 44: 114-124. 1938, as here given. The original description of *M. parviflora* var. *chinensis* Batal., which Pai raised to specific rank, has not been located by me.

Pterocephalus hookeri (C. B. Clarke) Airy-Shaw & M. L. Green, Hand-list
Rock Gard. Pl. Roy. Bot. Gard. Kew, ed. 4, 109. 1934.

First described from Sikkim.

Upper Ch'ia Ch'ing Kou, No. 877. On steppes. Common.

Height 45 cm.; flowers white, anthers deep purple.

CAMPANULACEAE

Adenophora polymorpha Ledeb. Fl. Alt. 1: 246 (in note). 1829.

First described from the Altai Mountains.

T'ai Hua, No. 533. Along exposed, clay roadsides. Common.

Flowers purple.

Adenophora potaninii Korsh. Mém. Acad. Sci. St. Pétersb. VII. 42³: 39. 1894.

First described from Szechwan.

La Chi Tzu Shan, No. 722. On exposed, moist, clay banks. Common.

Flowers purplish. The roots are used medicinally.

Adenophora spp.

1. Lang Tzu T'ang Kou, No. 583. Along roadsides and on margins of woods.
Occasional.

Height 60 cm.; flowers purplish blue.

2. Ho Lan Shan, No. 1084. Along exposed, moist, clay roadsides. Common.

Height 30 cm.; flowers blue.

Campanula aristata Wall. in Roxb. Fl. Ind. Ed. Carey 2: 98. 1824.

First described from Kashmir.

T'ai Hua, No. 511. Many growing together on moist bushy slopes. Common.

Flowers purple.

Codonopsis ussuriensis (Rupr.) Hemsl. Journ. Linn. Soc. Bot. 26: 6. 1889.

First described from Ussuri.

Ni Ma Lang Kou, No. 752. In woods. Common.

An herb, climbing on shrubs, the stems up to 3 meters long, with a peculiar odor; flowers dirty greenish brown. Valued medicinally.

Codonopsis viridiflora Maxim. Bull. Acad. Sci. St. Pétersb. 27: 496. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 258. 1881).

First described from Przhevalski's Kansu collections.

La Ch'iung Kou, No. 602; Upper Ch'ia Ch'ing Kou, No. 880. In dense tussocks on exposed, moist, grassy slopes. Common.

Stems with milky juice, peculiarly aromatic; flowers a pale dirty color, the stigma and stamens white. One of the most valuable Chinese medicines.

Cyananthus hookeri C. B. Clarke var. *hispidus* Franch. Journ. de Bot. 1: 281. 1887.

First described from Yunnan.

Upper Ch'ia Ch'ing Kou, No. 875. On steppes. Common.

A prostrate herb; stems 16 cm. long; flowers purplish.

COMPOSITAE

Achillea ptarmica L. Sp. Pl. 898. 1753.

First described from Europe.

Labrang, No. 777. Gregarious, on very moist, exposed grasslands. Common.

Height up to 60 cm.; flowers white.

Anaphalis alata Maxim. Bull. Acad. Sci. St. Pétersb. 27: 478. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 232. 1881).

First described from Przhevalski's Kansu collections.

Shih Men, No. 891. In dense patches on dry, exposed, clay slopes. Common.

Height 50 cm.; flowers white, fragrant.

Anaphalis aureo-punctata Lingelsh. & Borza, Repert. Sp. Nov. Fedde 13: 392. 1914.

First described from Yunnan.

A Chüan, No. 971. In moss in an *Abies* forest.

Flowers white, persistent throughout winter.

Anaphalis lactea Maxim. Bull. Acad. Sci. St. Pétersb. 27: 479. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 234. 1881).

First described from Przhevalski's Kansu collections.

Liu Fu Yai, No. 475; T'ai Hua, No. 532 (?); Ch'ia Ch'ing Kou, No. 937. On hard clay, along exposed, moist roadsides. Common.

Height up to 30 cm.; flowers white to pink.

Anaphalis margaritacea (L.) Benth. & Hook. f. Gen. Pl. 2: 303. 1873.³⁵

First described from western America and Kamchatka.

Liu Fu Yai, No. 465. On moist, gravel-strewn valley bottoms. Common.

Height up to 45 cm.; flowers white with a yellow disk.

Artemisia codonocephala Diels,³⁶ Notes Bot. Gard. Edinburgh 5: 186. 1912.

First described from Yunnan.

Ch'ia Ch'ing Kou, No. 938. Along exposed, clay roadsides. Common.

Height up to 1 meter; flowers purplish.

Artemisia matfeldii Pampanini var. **etomentosa** Hand.-Mazz. Medd. Bot. Trädg. Göteborg 12: 276. 1938.

First described from Sikang, Szechwan, and Kansu (Ching's collection).

Shih Men, No. 923. In pure stands of considerable extent, on steppes. Common.

Height up to 75 cm.; stems and leaves very aromatic and exuding a sticky sweet fluid; flowers purplish.

Artemisia sieversiana Ehrh. in Willd. Sp. Pl. 3: 1845. 1800.

First described from Siberia.

Ho Lan Shan, No. 1098. On grasslands. Common.

Height 60 cm.; flowers greenish yellow.

Artemisia aff. **sieversiana** Ehrh.

Shang Hsin Chuang, No. 680. In dense stands, along exposed, moist roadsides. Common.

Height up to 1.7 meters; flowers greenish yellow.

Artemisia vestita Wall. List No. 3301. 1831 (*nomen nudum*); DC. Prodr. 6: 106. 1837.

First described from India.

Ni Ma Lang Kou, No. 760. In dense formations, on exposed, moist slopes of rich soil. Common.

Height 50 cm.; flowers greenish yellow, aromatic.

Artemisia sp.

Lang Tzu T'ang Kou, No. 596. At shaded foot of cliffs, by a stream. Common.

Height up to 1 meter. Used medicinally.

³⁵ Handel-Mazzetti reports that this is between *A. margaritacea* var. *angustifolia* (Franch. & Sav.) Hand.-Mazz. (Symb. Sin. 7: 1102. 1936) and *A. margaritacea* var. *cinnamomea* (Wall.) Hand.-Mazz. (op. cit.), but "needs no particular name."

³⁶ Handel-Mazzetti has reported *A. umbrosa* Turcz. and *A. shansiensis* Pampanini as synonyms.

Aster ageratoides Turcz. var. **adustus** Maxim. Prim. Fl. Amur. 144. 1859.
First described from Amur.

Ni Ma Lang Kou, No. 756; Lower Tu I Kou, No. 955. Along exposed or shaded moist roadsides. Common.

Height up to 1 meter; flowers purplish or lilac, showy, faintly fragrant.

Aster altaicus Willd. Enum. Pl. Hort. Berol. 881. 1809.

First described from the Altai Mountains.

Ho Lan Shan, No. 1072. On dry, gravelly or clay soil. Common.

Height about 25 cm.; flowers violet, fragrant.

Aster alyssoides Turcz. var. **achnolepis** Hand.-Mazz. Notizbl. Bot. Gart. Berlin 13: 611. 1937.

Yao Chieh, No. 242 (type). On dry, bare, hard, clay cliffs.

Height 50 cm.

Aster crenatifolius Hand.-Mazz. Symb. Sin. 7: 1092. 1936.

First described from Szechwan.

Ch'ia Ch'ing Kou, No. 830. On moist bushy beaches by the T'ao Ho. Very common.

Height 75 cm.; flowers white, aromatic.

Aster flaccidus Bunge, Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 2: 599. 1835.

First described from the Altai Mountains.

Ta P'an Shan, No. 647. On moist, exposed, grassy slopes. Fairly common.

Height 22 cm.; heads with purple rays and yellow disk flowers.

Aster poliothamnus Diels, Repert. Sp. Nov. Fedde Beih. 12: 503. 1922.

First described from Tibet.

Ni Ma Lang Kou, No. 764. In dense clumps on exposed, dry, rocky cliffs. Common.

Height 25 cm.; flowers purple.

Aster vilmorini Franch. Journ. de Bot. 10: 373. 1896.

First described from Szechwan.

T'u Er P'ing, No. 430. In woods and on grasslands. Common.

Height up to 60 cm.; flowers with long, weak, purple rays and an orange-yellow disk.

Cacalia deltophylla (Maxim.) Mattf. Journ. Arn. Arb. 14: 39. 1933.

First described from Przhevalski's Kansu collections.

La Chi Tzu Shan, No. 712. In open stands, on exposed, moist slopes beside a stream. Common.

Height up to 45 cm.; flowers brownish yellow, aromatic.

Cancrinia maximowiczii C. Winkl. Act. Hort. Petrop. 12: 29. 1892.

First described from Przhevalski's Kansu collections.

Lien Ch'eng, No. 306. In low, dense tussocks on bare, exposed, dry, clay slopes.

Height 30 cm.; flowers yellow. Drought-resistant.

Carduus acanthoides L. Sp. Pl. 821. 1753.

First described from Europe.

Ho Lan Shan, No. 1137. Along moist edges of cultivated fields.

Height up to 1 meter; flowers purplish.

Centaurea picris Pall. Nov. Act. Acad. Sci. Petrop. 10: 318. 1797 (*nomen nudum*); Willd. Sp. Pl. 3: 2302. 1800.

First described from the Caspian Sea region.

Chung Wei, No. 236; Ho Lan Shan, No. 1056. Along exposed, dry, clay or rocky roadsides. Common.

Height 45 cm.; flowers purplish.

Chrysanthemum lavandulaefolium (Fisch.) Makino, Bot. Mag. Tokyo 23: 20 (in obs.). 1909.

First described from near Kalgan, Mongolia.

Ch'ia Ch'ing Kou, Nos. 825, 936. Along exposed, dry roadsides or at edge of woods. Fairly common.

Height 1 to 1.8 meters; stems purplish; flowers yellow, aromatic.

Chrysanthemum mutellina (Hand.-Mazz.) Hand.-Mazz. Symb. Sin. 7: 1112. pl. 7. fig. 2. 1936.

First described from Handel-Mazzetti's Yunnan collections.

Ta P'an Shan, No. 662. On exposed, moist roadsides, in rich soil. Common.

Height up to 45 cm.; flowers greenish yellow.

Chrysanthemum naktongense Nakai, Bot. Mag. Tokyo 23: 186. 1909.

First described from Korea.

Ho Lan Shan, No. 1085. On edges of woods, partially shaded. Fairly common.

Height 35 cm.; flowers purplish.

Chrysanthemum nematolobum Hand.-Mazz. Medd. Bot. Trädg. Göteborg 12: 271. 1938.

Forty li south of Lanchow, No. 1046 (type). In dense tufts, at base of exposed, clay cliffs.

Height 45 cm.; flowers lemon-yellow, fragrant.

Chrysanthemum pulvinatum Hand.-Mazz. Medd. Bot. Trädg. Göteborg 12: 263. 1938.

Hsün Hua Hsien, No. 739 (type). In a dense tussock, on exposed, dry, hard, clay cliffs. Common.

Height up to 30 cm.; flowers yellowish, aromatic.

Chrysanthemum salicifolium (Mattf.) Hand.-Mazz. Medd. Bot. Trädg. Göteborg 12: 264. 1938.

First described from Rock's Kansu collections.

T'ai Hua, No. 531. Along moist, exposed, mountain trails. Common.

Height 45 cm.; flowers greenish yellow.

Cirsium arvense (L.) Scop. var. *mite* Wimm. & Grab. Fl. Siles. 3: 82. 1829.

First described from Europe.

Ni Ma Lang Kou, No. 769. Gregarious, along exposed, moist, clay roadsides. Common.

Height up to 75 cm.; flowers purple.

Cirsium souliei (Franch.) Mattf. Journ. Arn. Arb. 14: 42. 1933.

First described from Przhevalski's Kansu collections and from Szechwan.

Ni Ma Lang Kou, No. 746. On exposed, very moist steppes. Common.

Flowers purple.

Cremanthodium discoideum Maxim. Bull. Acad. Sci. St. Pétersb. 27: 482. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 238. 1881).

First described from Przhevalski's Kansu collections.

Ta P'an Shan, No. 667. On exposed, moist, grassy slopes. Rare.

Flowers deep purple, very fragrant.

Cremanthodium lineare Maxim. Bull. Acad. Sci. St. Pétersb. 27: 482. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 238. 1881).

First described from Przhevalski's Kansu collections.

Yeh Ts'ang Kou, No. 819. On steppes. Fairly common locally.

Height 45 cm.; flowers lemon-yellow, drooping, fragrant, the involucre greenish blue.

Cremanthodium plantagineum Maxim. Bull. Acad. Sci. St. Pétersb. 27: 481. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 237. 1881).

First described from Przhevalski's Kansu collections.

Ta P'an Shan, No. 666; Ni Ma Lang Kou, No. 742. On exposed moist, grassy slopes. Common.

Height up to 50 cm.; heads very showy, the rays yellow, the disk purple.

Crepis flexuosa (DC.) Benth. & Hook. f. Gen. Pl. 2: 515. 1873.

First described from central Asia.

Lien Ch'eng, No. 310. On exposed, moist, sandy and gravelly beaches.

Height 15 cm.; flowers yellow.

Erigeron acris L. Sp. Pl. 863. 1753.

First described from Europe.

Ch'ing Kang Yai, No. 567. On shaded, rocky slopes. Rare.

Flowers pinkish.

Gerbera anandria (L.) Schultz Bip. Flora 27: 782. 1844.

First described from Siberia.

Ha La Hu Kou, No. 67. On moist, shaded slopes of rich soil.

Height 20 cm.; rays pink outside, white inside.

Inula brittanica L. var. **chinensis** (Rupr.) Regel, Mém. Acad. Sci. St. Pétersb. VII. 4: 84. 1861.

First described from the Ussuri River, Amur, and northern China.

Hsün Hua Hsien, No. 733; Ho Lan Shan, Nos. 1103, 1140. In dense patches, along exposed, moist roadsides and edges of cultivated fields. Common.

Height up to 60 cm.; flowers orange or lemon-yellow.

Inula racemosa Hook. f. Fl. Brit. Ind. 3: 292. 1881.

First described from Kashmir.

"Woo Chi," No. 676. In a moist, partially shaded place by a ruined house, possibly persistent from cultivation.

Height up to 75 cm.; flowers orange-yellow.

Inula salsoloides (Turcz.) Ostenf. in Hedin, S. Tibet 6: 39. 1922.

First described from Mongolia.

Chung Wei, No. 219; Yao Chieh, No. 254; Ho Lan Shan, No. 1058. On exposed, dry, clay or rocky slopes and along roadsides. Common.

Height up to 50 cm.; flowers lemon-yellow.

Ixeris chinensis (Thunb.) Nakai, Bot. Mag. Tokyo 34: 152. 1920; Fl. Sylvat. Kor. 14: 113. 1923.

First described from Japan.

Shui Mo Kou, Ho Lan Shan, No. 92; Pei Ssu Kou, No. 125; Nan Ssu Kou, No. 136; Hsi Mi Yai, No. 503; Ho Lan Shan, No. 1071. Usually in dry rocky places, sometimes along more moist roadsides. Common.

Height up to 20 cm.; flowers yellow, becoming pinkish brown.

Ixeris denticulata (Houtt.) Stebbins subsp. **elegans** (Franch.) Stebbins, Journ. Bot. Brit. & For. 75: 48. 1937.

First described from Szechwan.

Huang Hsi Kou, No. 194. Along exposed, dry, rocky roadsides and on grasslands. Common.

Height up to 45 cm.; flowers yellow.

Ixeris denticulata subsp. **sonchifolia** (Maxim.) Stebbins, Journ. Bot. Brit. & For. 75: 48. 1937.

First described from western Manchuria.

Ho Lan Shan, No. 1110. On grasslands.

Height 37 cm.; flowers lemon-yellow.

Lactuca sp.

Shih Men, No. 904. On a rocky cliff in the gorge. Rare.
Height 25 cm.

Leontopodium calocephalum (Franch.) Beauverd var. *uliginosum* Beauverd,
Bull. Soc. Bot. Genève II. 5: 144. 1913.

First described from Yunnan.

T'ai Hua, No. 541. Along exposed, moist, clay roadsides. Common.

Leontopodium leontopodioides (Willd.) Beauverd, Bull. Soc. Bot. Genève II.
1: 371. 1909.

First described from the Baikal region.

Ho Lan Shan, No. 1153. On exposed, gravelly foothills.

Flowers yellowish.

Leontopodium linearifolium Hand.-Mazz. Beih. Bot. Centralbl. 44, Abt. 2:
100. 1927.

First described from the area from Kashmir to Kamchatka, including citation
of Ching's collection.

Ch'ia Ch'ing Kou, No. 949. On steppes. Common.

Flowers creamy white.

Ligularia achyrotricha (Diels) Hand.-Mazz. Contr. Inst. Bot. Nat. Acad.
Peiping 5: 113. 1937.³⁷

A Chüan, No. 980. On shady stream banks. Common.

Height up to 1.3 meters; flowers yellow, aromatic.

Ligularia kansuensis Hand.-Mazz. Bot. Jahrb. Engler 69: 125. 1938.

Cho Ni, No. 999 (type). Gregarious, on exposed, moist, clay banks. Common.

Height 2 meters; flowers lemon-yellow.

Ligularia macrodonta Ling, Contr. Inst. Bot. Nat. Acad. Peiping 5: 2. *pl. 2*.
1937.³⁷

Upper Ch'ia Ch'ing Kou, No. 866. On steppes and in woods. Common.

Height up to 90 cm.; stems purplish; leaves glaucous beneath, yellowish green
above; rays yellow; involucre greenish yellow.

Ligularia przewalskii (Maxim.) Diels, Bot. Jahrb. Engler 29: 621. 1901.

First described from Mongolia.

Shui Mo Kou, near Lien Ch'eng, No. 362. On exposed stream banks. Com-
mon.

Flowers yellow.

Ligularia sagitta (Maxim.) Mattf. Journ. Arn. Arb. 14: 40. 1933.

First described from Przhevalski's Kansu collections.

T'ai Hua, No. 513. Gregarious, on moist, bushy slopes. Common.

Height 45 cm.; flowers bright yellow.

Ligularia virgaurea (Maxim.) Mattf. Journ. Arn. Arb. 14: 40. 1933.

First described from eastern Mongolia and Shensi.

T'ai Hua, No. 512; La Chi Tzu Shan, No. 698. On moist, bushy slopes and
moist steppes. Common.

Height up to 1.5 meters; stems and leaves purplish; flowers bright yellow, faintly
fragrant.

Pertya discolor Rehd. Journ. Arn. Arb. 10: 135. 1929.

First described from Rock's Cho Ni, Kansu, collections and from Shensi.

Labrang, No. 778. On dry, exposed, clay slopes, or in open woods. Common.

A subherbaceous shrub, up to 1.6 meters high; fruit brownish.

³⁷ These references could not be verified.

Pertya sinensis Oliver, Hook. Icon. Pl. 23: pl. 2214. 1892.

First described from Hupeh.

Malisoondo, No. 889; Shih Men, No. 900. On exposed stream-banks or in forests. Common.

A dense shrub, up to 3 meters high; flowers purple; fruit brownish.

Picris hieracioides L. subsp. *japonica* (Thunb.) Hand.-Mazz. Symb. Sin. 7: 1177. 1936.

First described from Japan.

Shui Mo Kou, near Lien Ch'eng, No. 354; Lang Tzu T'ang Kou, No. 598. On moist edges of cultivated fields and in woods. Rather rare.

Height 75 cm.; flowers lemon-yellow.

Prenanthes tatarinowii Maxim. subsp. *macrantha* Stebbins subsp. nov.

A subspecies typica differt foliis pinnatis, segmento terminale 3 partito; involucris longioribus, 12–13 mm. longis; phyllis exterioribus ad 3.5–4 mm. longis.

Differs from typical *P. tatarinowii* in its pinnate leaves, which have two pairs of well-developed lateral lobes, and in its larger involucre, which have relatively long outer bracts (the longest 3.5 to 4 mm. long in subsp. *macrantha*, 1.5 to 3 mm. in the typical form).

Type in the herbarium of the University of California collected by R. C. Ching, No. 913, in partial shade in woods in Shih Men, south of Old T'ao Chou, Kansu, alt. 3,600 to 4,200 meters, August 31, 1923; duplicate in the U. S. National Herbarium. An additional specimen seen is *Rock 14591*, in the Gray Herbarium, collected in a moist meadow and along a stream in "Drakana," in the upper Tebbu country, southern Kansu.

This subspecies is quite distinct from typical *P. tatarinowii* of Hopei and Shansi Provinces in leaf shape and size of involucre, and it occurs at much higher elevations. It probably also has a different chromosome number. Typical *P. tatarinowii*, of which the somatic chromosome number is $2n=16$ (Babcock, Stebbins, and Jenkins, Cytologia Fujii Jubil. Vol., p. 190, 1937), has stomata 25–29 μ long, and its pollen is regular. The stomata of subsp. *macrantha* are 32–36 μ long, while the pollen grains are somewhat irregular in size. Since these characteristics are possessed by the only tetraploid species of *Prenanthes* known, *P. alba*, it is likely that *P. tatarinowii* subsp. *macrantha* is also tetraploid, with the somatic chromosome number $2n = 32$. This might justify its recognition as a species were it not for the fact that one specimen from Hupeh (*Henry 6748*, Gray Herb.), which morphologically resembles typical *P. tatarinowii*, also has stomata and pollen grains that suggest its polyploid condition, while another from Szechwan (*Fang 4344*) has the stomata and pollen of a diploid but resembles subsp. *macrantha* in leaf shape and in habitat. Apparently *P. tatarinowii* in northwestern China consists of a complex of closely interrelated diploid and polyploid forms, which cannot be fully understood until a much larger series of specimens is available than at present.

Saussurea acroura Cummins, Kew Bull. Misc. Inf. 1908: 19. 1908.

First described from western China.

Lower Tu I Kou, No. 959. In woods along partially exposed, clay roadsides. Fairly common.

Height up to 75 cm.; flowers purplish brown.

Saussurea chingiana Hand.-Mazz. Notizbl. Bot. Gart. Berlin 13: 647. 1937.

"Kwa Shan," 60 li south of Lanchow, No. 1035 (type). On exposed, fairly moist clay banks. Rare.

Height 45 cm.; flowers purple.

Saussurea graminea Dunn var. *ortholepis* Hand.-Mazz. Medd. Bot. Trädg. Göteborg 12: 339. 1938.

Ch'ia Ch'ing Kou, No. 948 (type). On steppes. Rare.

Height 10 cm.; flowers purple, faintly fragrant.

Saussurea japonica (Thunb.) DC. Ann. Mus. Hist. Nat. (Paris) 16: 203. 1810.
First described from Japan.

Ni Ma Lang Kou, No. 747; Ch'ia Ch'ing Kou, No. 939, in part. Gregarious, on exposed, moist steppes or along roadsides. Common.

Height 30 cm.; flowers purple, fragrant.

Saussurea kansuensis Hand.-Mazz. Notizbl. Bot. Gart. Berlin 13: 648. 1937.

First described from Rock's and Ching's Kansu collections.

Upper Ch'ia Ch'ing Kou, No. 854. On steppes. Common.

A spreading plant, 12 cm. high; flowers purple, very fragrant.

Saussurea katochaete Maxim. Bull. Acad. Sci. St. Pétersb. 27: 491. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 251. 1881).

First described from Przhevalski's Kansu collections.

La Chi Tzu Shan, No. 700. On exposed, moist, gravelly bottoms of gorges. Common.

Height 10 cm.; flowers deep purple.

Saussurea likiangensis Franch. var. *siningensis* Hand.-Mazz. Medd. Bot. Trädg. Göteborg 12: 336. 1938.

La Ch'iong Kou, No. 634 (type). In dense clumps or tufts, on shaded slopes. Fairly common.

Height 75 cm.; flowers deep purple.

Saussurea otophylla Diels, Bot. Jahrb. Engler 36, Beibl. 82: 109. 1905.

First described from Shensi.

Malisoondo, No. 890; Shih Men, No. 924. In woods or on steppes. Rare.

Height up to 1.2 meters; flowers purplish.

Saussurea parviflora (Poir.) DC. var. *cuspidata* Hand.-Mazz. Medd. Bot. Trädg. Göteborg 12: 316. 1938.

First described from Shansi.

La Chi Tzu Shan, No. 710. On exposed, moist, grassy slopes. Common.

Height up to 60 cm.; flowers purplish.

Saussurea phaeantha Maxim. Bull. Acad. Sci. St. Pétersb. 27: 489. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 248. 1881).

First described from Przhevalski's Kansu collections.

La Chi Tzu Shan, Nos. 688, 704. On exposed, moist steppes. Common.

Height up to 45 cm.; flowers deep purple.

Saussurea runcinata DC. var. *dentata* Ledeb. Fl. Ross. 2: 663. 1846(?).
First described from Dahuria.

Ho Lan Shan, No. 1077. Along clay roadsides.

Height 60 cm.; flowers pink.

Saussurea stella Maxim. Bull. Acad. Sci. St. Pétersb. 27: 490. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 249. 1881).

First described from Przhevalski's Kansu collections.

Ni Ma Lang Kou, No. 744. On exposed, moist steppes. Common.

A rosette form, 7 cm. high.

Saussurea superba Anthony, Notes Bot. Gard. Edinburgh 18: 212. 1934.

First described from Yunnan.

Upper Ch'ia Ch'ing Kou, No. 873. On steppes. Common.

Height 15 cm.; flowers purple, very fragrant.

Saussurea ussuriensis Maxim. Mém. Acad. Sci. St. Pétersb. Sav. Étrang. 9: 167. 1859.

First described from northern China.

Ch'ia Ch'ing Kou, No. 939, in part. Along exposed, clay roadsides. Common. Height 30 cm.; flowers purplish, fragrant.

Saussurea sp.

Lung Hua, No. 783. In partially shaded woods. Common.

Flowers purplish.

Scorzonera austriaca Willd. Sp. Pl. 3: 1498. 1800.

First described from Europe.

Shui Mo Kou, Ho Lan Shan, No. 105; Ho Lan Shan, No. 1152. Along exposed, dry roadsides. Rare.

Height up to 30 cm.; flowers lemon-yellow.

Scorzonera capito Maxim. Bull. Acad. Sci. St. Pétersb. 32: 491. 1888 (Mél. Biol. Acad. Sci. St. Pétersb. 12: 733. 1886).

First described from Przhevalski's and Potanin's Mongolia collections.

Pei Ssu Kou, No. 114. In dry clay or gravelly soil along exposed roadsides. Common.

Height 20 cm.; flowers yellow.

Scorzonera divaricata Turcz. Bull. Soc. Nat. Moscou 5: 200. 1832.

First described from Mongolia.

Hsi Yeh Kou, No. 169; Yao Chieh, No. 255. On exposed, dry, clay cliffs. Rare.

Height up to 45 cm.

Scorzonera mongolica Maxim. Bull. Acad. Sci. St. Pétersb. 32: 492. 1888.

First described from Mongolia.

Hsin Ch'eng, north of Ningsia, No. 209. On hard, dry, clay slopes. Rare.

Flowers yellow.

Scorzonera sp.

Nan Ssu Kou, No. 137. In a dry, exposed desert of coarse sand and gravel. Common.

Flowers yellow.

Senecio argunensis Turcz. Bull. Soc. Nat. Moscou 20²: 18. 1847.

First described from Dahuria.

Shang Hsin Chuang, No. 683. In dense patches, along exposed, moist roadsides. Common.

Height up to 1 meter; flowers orange to yellow, with a greenish-yellow disk.

Senecio kaschkarowi C. Winkl. Act. Hort. Petrop. 14: 152. 1895.

First described from Szechwan.

La Chi Tzu Shan, No. 723. Scattered, on exposed, moist clay banks. Common.

Height 75 cm.; flowers yellow.

Senecio nemorensis L. Sp. Pl. 870. 1753, sens. lat.

First described from Germany and Siberia.

Ho Lan Shan, No. 1097. On wet land, most commonly along edges of fields. Common.

Height 60 cm.; flowers dull lemon-yellow.

Senecio roborowskii Maxim. Bull. Acad. Sci. St. Pétersb. 27: 487. 1882 (Mél. Biol. Acad. Sci. St. Pétersb. 11: 245. 1881).

First described from Przhevalski's Kansu collections.

Upper Shui Mo Kou, near Lien Ch'eng, No. 387. In woods.

Height 50 cm.

Senecio thianschanicus Regel & Schmalh. Act. Hort. Petrop. 6: 311. 1880.

First described from Tien Shan.

T'ien T'ang Ssu, No. 563. Beside streams, on gravelly bottoms of gorges. Rare.

Height 45 cm.; flowers yellow, aromatic.

Senecio winklerianus Hand.-Mazz. Symb. Sin. 7: 1123. 1936 (based on *S. acerifolius* C. Winkl. Act. Hort. Petrop. 13: 9. 1893).

First described from Potanin's Szechwan and Kansu collections.

Shih Men, No. 930. In dense *Picea* and *Abies* forests. Very common.

Height 45 cm.; flowers lemon-yellow.

Serratula centauroides L. Sp. Pl. 820. 1753.

First described from Siberia.

Yao Chieh, No. 281; Hsi Mi Yai, No. 489. Along dry, exposed, clay roadsides, and stream banks. Common.

Height up to 1.3 meters; flowers purplish.

Sonchus brachyotus DC. Prodr. 7: 186. 1838.

First described from the Altai Mountains and Dahuria.

Yao Chieh, No. 276; middle Tu I Kou, No. 965. In cultivated fields and along roadsides. Fairly common.

Height up to 60 cm.; flowers yellow.

Soroseris hookeriana (C. B. Clarke) Stebbins subsp. *erysimoides* (Hand.-Mazz.) Stebbins, Mem. Torrey Club 19³: 46, fig. 11, *i-l.* 1940.

First described from Szechwan, Shensi, Kansu (Ching's collection), Tsing Hai, Sikang, Yunnan, and Tibet.

La Chi Tzu Shan, No. 707. On partially shaded, very moist steppes. Common, scattered.

Height up to 35 cm.; flowers yellow; fruit deep green.

Stereosanthus sp.

Tai Hua, No. 552. Common, in woods.

Height 45 cm.; flowers purplish.

†**Taraxacum calanthodium** Dahlst. Medd. Bot. Trädg. Göteborg 2: 150. 1926.

First described from Szechwan.

La Ch'ung Kou, No. 625. On partially shaded, grassy slopes. Common.

Height up to 67 cm.; flowers yellow.

Taraxacum dissectum Ledeb. Fl. Ross. 2: 814. 1846 (?).

First described from eastern Siberia.

Wang Yeh Fu, No. 35; Ha La Hu Kou, No. 62; Wang Te Lin Kou, No. 83. On exposed, dry or moist, gravelly valley bottoms, often in patches. Common.

Flowers bright yellow, fragrant. This plant is eaten locally.

INDEX

[Synonyms in italics. Page numbers of principal entries in boldface]

	Page		Page
<i>Abelia</i>	587	<i>Anisodus tanguticus</i>	658
<i>zanderi</i>	592, 662	<i>Apocynaceae</i>	653
<i>Abies sutchuenensis</i>	592, 593	<i>Aquilegia ecalcarata</i>	615
<i>Acanthopanax giraldii</i>	646	<i>viridiflora</i>	615
<i>pilosulus</i>	646	<i>Arabis alaschanica</i>	622
<i>Acer</i>	587, 593	<i>hirsuta</i>	622
<i>davidi</i>	590, 642	<i>pendula</i>	622
<i>ginnala</i>	642	<i>Araceae</i>	600
<i>maximowiczii</i>	643	<i>Araliaceae</i>	564, 646
<i>tetramerum betulifolium</i> ..	590, 643	<i>Arctous alpinus</i>	648
<i>Aceraceae</i>	624	<i>Arenaria cerastiformis</i>	612
<i>Achillea</i>	564	<i>holosteoides</i>	612
<i>ptarmica</i>	666	<i>kansuensis</i>	613
<i>Aconitum</i>	587	<i>przewalski</i>	613
<i>excelsum</i>	614	<i>Arisaema consanguineum</i>	600
<i>gymnandrum</i>	614	<i>Arnebia szechenyii</i>	654
<i>szechenyianum</i>	614	<i>Artemisia codonocephala</i>	667
<i>tanguticum</i>	614	<i>mattfeldii etomentosa</i>	667
<i>volubile</i>	614	<i>sieversiana</i>	667
<i>Actinidiaceae</i>	644	<i>vestita</i>	667
<i>Adenophora polymorpha</i>	666	<i>Arthropytum arborescens</i> ..	611 , 661
<i>potaninii</i>	666	<i>Arundinaria</i> sp.....	596
<i>Agrimonia eupatoria</i>	627	<i>Arundinella anomala</i>	596
<i>Agrostis hugoniana</i>	596	<i>Asclepiadaceae</i>	653
<i>Ajuga lupulina</i>	655	<i>Asparagus brachyphyllus</i>	603
<i>ovalifolia</i>	655	<i>trichophyllus</i>	603
<i>Aletris glabra</i>	602	<i>Asperugo procumbens</i>	654
<i>Allium chrysanthum</i>	602	<i>Aster</i>	564, 588
<i>cyaneum</i>	602	<i>ageratoides adustus</i>	668
<i>forrestii</i>	602	<i>altaicus</i>	668
<i>henryi</i>	602	<i>alyssoides achnolepis</i>	668
<i>kansuense</i>	602	<i>crenatifolius</i>	668
<i>rubellum</i>	602	<i>flaccidus</i>	668
<i>tenuissimum</i>	602	<i>poliothamnus</i>	668
<i>victoralis</i>	602	<i>vilmorini</i>	668
<i>Ampelopsis japonica</i>	643	<i>Astragalus</i>	564, 587
<i>Anaphalis</i>	588	<i>adsurgens</i>	634
<i>alata</i>	666	<i>chingianus</i>	634
<i>aureo-punctata</i>	667	<i>chrysopterus</i>	634
<i>lactea</i>	667	<i>discolor</i>	634
<i>margaritacea</i>	667	<i>floridus</i>	634
<i>angustifolia</i>	667	<i>hoantchy</i>	634
<i>cinnamomea</i>	667	<i>hypogaeus aff</i>	635
<i>Androsace</i>	590	<i>longilobus</i>	635
<i>erecta</i>	649	<i>meliolotoides</i>	635
<i>mariae tibetica</i>	649	<i>monadelphus</i>	635
<i>saxifragaefolia aff</i>	649	<i>przewalskii</i>	635
<i>Anemone</i>	590	<i>variabilis</i>	635
<i>japonica tomentosa</i>	615	<i>Atraphaxis lanceolatum</i>	610
<i>narcissifolia</i>	615	<i>Avena altior</i>	596
<i>rivularis</i>	615	<i>suffusca</i>	596
<i>rupestris aff</i>	615	<i>Balanophora</i> sp.....	609
<i>Angelica wulsiniana</i>	646	<i>Balanophoraceae</i>	609

VIII CONTRIBUTIONS FROM THE NATIONAL HERBARIUM

	Page		Page
Balsaminaceae	643	Chenopodium hybridum	612
Batrachium flavidum	615	Chloris virgata	597
Beckmannia erucaeformis	596	Chrysanthemum lavandulaefolium	669
Berberidaceae	619	mutellina	669
Berberis	587, 589, 592	naktongense	669
boschanii	619	nematolobum	669
brachypoda	619	pulvinatum	669
diaphana	619	salicifolium	669
kansuensis	619	Chrysosplenium	564
parvifolia	619	axillare	625
purdomii	619	chamaedryoides	625
vernae	620	chingii	625
Betula	587	griffithii	625
albo-sinensis	590, 607	guebriantianum	625
septentrionalis	590, 607	nudicaule	625
japonica	590, 607	Cimicifuga foetida typica	615
Betulaceae	607	Cirsium	564
Biebersteinia heterostemon	640	arvense mite	669
Bignoniaceae	661	souliei	669
Boraginaceae	564, 654	Cistanche salsa	661
Boschniakia sp.	661	Clematis	590
Brachypodium sylvaticum	596	aethusifolia	616
Brassica juncea	622	alpina	616
Bromus tectorum	596	brevicaudata	616
Buddleia alternifolia	651	glauca akebioides	616
Bupleurum spp.	646	grata	616
Cacalia deltophylla	668	macropetala	616
Calamagrostis epigeios	596	nannophylla	616
scabrescens	596	tangutica	616
Caltha scaposa	615	Clematoclethra actinidioides	644
Campanula aristata	666	integrifolia	644
Campanulaceae	666	Clintonia udensis	603
Cancerina maximowiczii	668	Cobresia schoenoides	600
Cannabis sativa	609	Codonopsis ussuriensis	666
Caprifoliaceae	662	viridiflora	666
Capsella bursa-pastoris	622	Coluria longifolia	637
Caragana	587, 589, 590	Compositae	564, 666
brevifolia	636	Convolvulaceae	654
jubata	586, 590, 636	Convolvulus arvensis	654
maximowicziana	636	tragacanthoides	654
opulens	636	Cornaceae	647
pygmaea	636	Cornus	587
roborovskyi	636	bretschneideri	647
tangutica	590, 636	macrophylla	647
tibetica	636	poliophylla	647
Cardamine macrophylla	622	Corydalis	564, 587
tangutorum	622	adunca	620
Carduus acanthoides	668	albicaulis	621
Carex	564	chingii	621
atrata	599	dasyptera	621
pullata	599	hannae	621
caespitosa	599	impatiens	621
dielsiana	599	kansuana	621
pallida	599	linarioides	621
stenophylla	600	pauciflora holanschanica	621
Carum carvi	646	rosea	621
Caryophyllaceae	612	scaphopetala	621
Caryopteris mongholica	655	Corylus	587
tangutica	652	sieboldiana mandschurica	599, 607
Celastraceae	642	Cotoneaster	587, 589, 592
Centaurea picris	668	acutifolia villosula	593, 627
Cerastium vulgatum	613	adpressa	628
Chamaenirion angustifolium	646	ambigua	628
Chamaerhodos erecta	627	apiculata	628
Chenopodiaceae	611	foveolata	628
Chenopodium botrys	612		

	Page		Page
<i>Cotoneaster melanocarpa</i>	628	<i>Epimedium sagittatum</i>	620
<i>multiflora</i>	628	<i>Ericaceae</i>	648
<i>calocarpa</i>	628	<i>Erigeron acris</i>	670
<i>racemiflora soongorica</i>	628	<i>Eritrichium pectinatum</i>	654
<i>tomentosa</i>	628	<i>Erodium stephanianum</i>	640
<i>Crassulaceae</i>	624	<i>Eruca sativa lativalvis eriocarpa</i>	623
<i>Crataegus</i>	587	<i>Euphorbia esula</i>	641
<i>kansuensis</i>	629	<i>humifusa</i>	641
<i>Cremanthodium discoideum</i>	669	<i>macrorhiza</i>	641
<i>lineare</i>	669	<i>Euphorbiaceae</i>	641
<i>plantagineum</i>	670	<i>Euphrasia officinalis</i>	658
<i>Crepis</i>	564, 588	<i>tatarica</i>	658
<i>flexuosa</i>	670	<i>Eurotia ceratoides</i>	612
<i>Cruciferae</i>	564, 622	<i>Eutrema compactum</i>	623
<i>Cupressaceae</i>	594	<i>Evonymus</i>	587
<i>Cuscuta chinensis</i>	654	<i>amygdalifolia</i>	642
<i>Cuscutaceae</i>	654	<i>giraldii angustialata</i>	642
<i>Cyananthus hookeri hispidus</i>	666	<i>nanoides</i>	642
<i>Cymbaria mongolica</i>	658	<i>nanus</i>	642
<i>Cynanchum chinense</i>	653	<i>phellomana</i>	642
<i>mongolicum</i>	654	<i>przewalskii</i>	642
<i>sibiricum</i>	654	<i>Fagaceae</i>	608
<i>Cyperaceae</i>	599	<i>Fedia rupestris</i>	665
<i>Cypripedium fasciolatum</i>	604	<i>Ferula</i> sp.....	647
<i>Daphne</i>	587	<i>Fragaria vesca</i>	629
<i>giraldii</i>	591, 645	<i>Fumariaceae</i>	620
<i>tangutica</i>	645	<i>Galeopsis tetrahit</i>	656
<i>Delphinium</i>	587	<i>Galium boreale</i>	662
<i>grandiflorum</i>	616	<i>verum</i>	662
<i>henryi</i>	616	<i>Gentiana</i>	587, 588
<i>labrangense</i>	617	<i>chingii</i>	651
<i>tanguticum</i>	617	<i>dahurica</i>	651
<i>tongolense</i>	617	<i>farreri</i>	651
<i>Deschampsia caespitosa</i>	597	<i>grumii</i>	651
<i>Descurainia sophia hygrophila</i>	622	<i>hexaphylla caudata</i>	652
<i>Deyeuxia</i> spp.....	597	<i>leucomelaena</i>	652
<i>Dianthus chinensis</i>	613	<i>officinalis</i>	652
<i>superbus</i>	613	<i>przewalskii</i>	652
<i>Dictamnus fraxinella</i>	641	<i>siphonantha latifolia</i>	652
<i>Dilophia fontana</i>	622	<i>squarrosa</i>	652
<i>Dioscorea quinqueloba</i>	604	<i>straminea</i>	652
<i>Dioscoreaceae</i>	604	<i>striata</i>	652
<i>Dipsacaceae</i>	665	<i>Gentianaceae</i>	564, 651
<i>Dipsacus asper</i>	665	<i>Gentianella</i> spp.....	653
<i>Draba eriopoda</i>	623	<i>Geraniaceae</i>	640
<i>lanceolata chingii</i>	623	<i>Geranium eriostemon</i>	640
<i>leiocarpa</i>	623	<i>pratense</i>	640
<i>nemorosa</i>	623	<i>pylzowianum</i>	640
<i>Dracocephalum heterophyllum</i>	655	<i>sibiricum</i>	640
<i>imberbe</i>	656	<i>Gerbera anandria</i>	670
<i>sibiricum</i>	656	<i>Geum strictum</i>	629
<i>tanguticum</i>	656	<i>Glaux maritima</i>	649
<i>Elaeagnaceae</i>	645	<i>Glycyrrhiza uralensis</i>	637
<i>Elaeagnus</i>	587	<i>Gnetaceae</i>	595
<i>angustifolia</i>	586, 645	<i>Gramineae</i>	564, 596
<i>umbellata</i>	593, 646	<i>Grossulariaceae</i>	627
<i>Elsholtzia cristata</i>	656	<i>Gueldenstaedtia diversifolia</i>	637
<i>densa</i>	656	<i>Gypsophila davurica</i>	613
<i>eristachya</i>	656	<i>gmelini</i>	613
<i>Elymus dahuricus</i>	597	<i>Habenaria bifolia</i>	604
<i>dasystachys</i>	597	<i>conopsea</i>	604
<i>sibiricus</i>	597	<i>cucullata</i>	604
<i>Ephedra equisetina</i>	595	<i>Halenia elliptica</i>	653
<i>intermedia</i>	595	<i>Halopeplis</i> sp.....	612
<i>monosperma</i>	595	<i>Haplophyllum tragacanthoides</i>	641
<i>Epilobium tanguticum</i>	646	<i>Hedysarum multijugum</i>	637

X CONTRIBUTIONS FROM THE NATIONAL HERBARIUM

	Page		Page
Hedysarum polybotrys.....	637	Lepidium apetalum.....	623
pumilum.....	637	latifolium sibiricum.....	623
Heracleum barbatum.....	647	Leptodermis sp.....	662
millefolium.....	647	Leptopyrum fumarioides.....	617
Herminium tanguticum.....	605	Lespedeza.....	564
Hippophae rhamnoides procera.....	590, 645	daurica.....	637
Hololachna songarica.....	644	floribunda.....	638
Hordeum nodosum.....	597	Ligularia achyrotricha.....	671
Humulus lupulus.....	609	kansuensis.....	671
Hydrangea.....	587	macrodonia.....	671
bretschneideri.....	591, 625	przewalskii.....	671
Hyoscyamus niger.....	658	sagitta.....	671
Hypecoum leptocarpum.....	620	virgaurea.....	671
Hypericaceae.....	644	Ligusticum pilgerianum.....	647
Hypericum monanthemum aff.....	644	Liliaceae.....	564, 602
Impatiens sp.....	643	Lloydia tibetica purpurascens.....	603
Incarvillea compacta.....	661	Loganiaceae.....	651
sinensis.....	661	Lonicera.....	587, 590, 591, 592
variabilis.....	661	caerulea.....	662
Inula brittanica chinensis.....	670	chrysantha.....	662
racemosa.....	670	ferdinandi.....	662
salsoloides.....	670	heteroloba.....	662
Iridaceae.....	604	hispida.....	663
Iris ensata.....	604	inconspicua.....	663
polysticta.....	604	microphylla.....	663
tenuifolia.....	604	gracilior.....	663
ventricosa.....	604	nervosa.....	663
Ixeris.....	564	syringantha.....	663
chinensis.....	670	tangutica.....	663
denticulata elegans.....	670	thibetica.....	663
sonchifolia.....	670	trichosantha.....	664
Juglandaceae.....	607	Loranthaceae.....	609
Juglans regia.....	590, 607	Lychnis apetala.....	613
Juncaceae.....	600	Lycium chinense.....	658
Juncaginaceae.....	595	Lycopsis orientalis.....	655
Juncus allioides.....	600	Maddenia hypoxantha.....	629
bufonius.....	600	Maianthemum bifolium.....	603
castaneus.....	600	Malcolmia africana.....	623
exploratorum.....	600	Malus.....	587, 589
giganteus.....	600	baccata.....	629
luzuliformis potanini.....	602	kansuensis.....	629
Juniperus.....	587, 591	transitoria.....	592, 629
chinensis.....	594	Malva verticillata.....	644
pseudosabina.....	592, 594	Malvaceae.....	644
rigida.....	589, 594	Marrubium incisum.....	656
saltuaria.....	592, 594	Meconopsis.....	588
squamata.....	592, 594	horridula racemosa.....	620
fargesii.....	592, 595	integrifolia.....	620
Kalidium foliatum.....	612	punicea.....	620
Koenigia islandica.....	610	Medicago lupulina.....	638
Labiatae.....	655	sativa.....	638
Lactuca sp.....	671	Melica scabrosa.....	597
Lamium amplexicaule.....	656	Melilotus alba.....	638
Lancea tibetica.....	658	Mentha arvensis.....	657
Lappula redowskii.....	655	Messerschmidtia siberica.....	655
Larix.....	587	Microula myosotidea.....	655
potanini.....	586, 592, 593	trichocarpa.....	655
Lathyrus pratensis.....	637	Moraceae.....	609
Leguminosae.....	634	Morina alba.....	665
Leontopodium calocephalum uli- ginosum.....	671	chinensis.....	665
leontopodioides.....	671	parviflora chinensis.....	665
linearifolium.....	671	Morus alba.....	590, 609
Leonurus lanatus.....	656	Myricaria germanica.....	644
sibiricus.....	656	Nasturtium palustre.....	623
		Nepeta macrantha.....	657
		Nitraria schoberi.....	640

	Page		Page
<i>Odontites rubra</i>	658	<i>Pleurospermum kansuense</i>	647
<i>Oleaceae</i>	650	<i>longicaule</i>	647
<i>Onagraceae</i>	646	<i>Plumbagella micrantha</i>	650
<i>Orchidaceae</i>	564, 604	<i>Plumbaginaceae</i>	650
<i>Orchis chusua</i>	605	<i>Poa acroleuca</i>	598
<i>Orobanchaceae</i>	661	<i>arctica</i>	598
<i>Orobanche ammophila</i>	661	<i>attenuata vivipara</i>	598
<i>coerulescens typica</i>	661	<i>nemoralis</i>	598
<i>Orobis lathyroides</i>	639	<i>sphondylodes</i>	598
<i>Oryzopsis munroi</i>	597	<i>Podophyllum emodi</i>	620
<i>Ostryopsis</i>	587, 589	<i>Polemoniaceae</i>	654
<i>dauidiana</i>	607	<i>Polemonium caeruleum villosum</i>	654
<i>Oxygraphis glacialis</i>	617	<i>Polygonaceae</i>	610
<i>Oxytropis</i>	564	<i>Polygonatum fuscum</i>	603
<i>glabra</i>	638	<i>multiflorum</i>	603
<i>imbricata</i>	638	<i>sibiricum</i>	603
<i>melanocalyx</i>	638	<i>Polygala sibirica</i>	641
<i>yunnanensis aff.</i>	638	<i>Polygalaceae</i>	641
<i>Paeonia anomala</i>	617	<i>Polygonum</i>	564, 587
<i>Panax ginseng</i>	646	<i>amphibium</i>	610
<i>Papaver nudicaule</i>	620	<i>auberti</i>	610
<i>Papaveraceae</i>	620	<i>aviculare</i>	610
<i>Paraquilegia</i>	588	<i>cyanandrum</i>	610
<i>anemonoides</i>	617	<i>lapathifolium salicifolium</i>	610
<i>Parnassia</i>	587, 588	<i>macrophyllum</i>	610
<i>laxmanni</i>	626	<i>nepalense</i>	610
<i>trinervis viridiflora</i>	626	<i>pilosum</i>	610
<i>Patrinia rupestris</i>	665	<i>sibiricum</i>	611
<i>Pedicularis</i>	564, 587, 588	<i>tataricum</i>	611
<i>alaschanica</i>	659	<i>viviparum</i>	611
<i>anas</i>	659	<i>Populus</i>	587, 591
<i>armata</i>	659	<i>cathayana</i>	605
<i>chingii</i>	659	<i>euphratica</i>	605
<i>kansuensis</i>	659	<i>simonii</i>	579, 586, 605
<i>muscicola</i>	659	<i>suaveolens</i>	577, 605
<i>rhinanthoides</i>	659	<i>tremula dauidiana</i>	586,
<i>rudis</i>	659	589, 590, 605	
<i>striata</i>	659	<i>Potentilla</i>	587, 589
<i>torta</i>	660	<i>anserina</i>	629
<i>Peganum harmala</i>	640	<i>bifurca</i>	629
<i>nigellastrum</i>	640	<i>chinensis</i>	629
<i>Pennisetum flaccidum</i>	597	<i>fruticosa parvifolia</i>	630
<i>Pertya discolor</i>	671	<i>veitchii</i>	630
<i>sinensis</i>	672	<i>leschenaultiana</i>	630
<i>Phalaris arundinacea</i>	597	<i>salesoviana</i>	630
<i>Phelipaea salsa</i>	611, 661	<i>subacaulis</i>	630
<i>Philadelphus</i>	587	<i>viscosa</i>	630
<i>pekinensis kansuensis</i>	591, 626	<i>Prenanthes alba</i>	672
<i>Phleum alpinum</i>	598, 599	<i>tatarinowii</i>	672
<i>Phlomis mongolica</i>	657	<i>macrantha</i>	672
<i>Phragmites communis</i>	598	<i>Primula</i>	590
<i>Picea</i>	587	<i>algida</i>	649
<i>asperata</i>	589, 590, 592, 593, 594	<i>gemmifera</i>	649
<i>purpurea</i>	592, 593	<i>sataniensis</i>	649
<i>wilsonii</i>	593	<i>stenocalyx</i>	649
<i>Picris hieracioides japonica</i>	672	<i>urticifolia</i>	650
<i>Pinaceae</i>	593	<i>woodwardii</i>	650
<i>Pinus</i>	587	<i>Primulaceae</i>	564, 649
<i>armandi</i>	593, 594	<i>Prinsepia uniflora</i>	630
<i>tabulaeformis</i>	589, 594	<i>Prunus</i>	587, 591, 592
<i>Piptanthus mongalicus</i>	638	<i>mongolica</i>	630
<i>Plantaginaceae</i>	661	<i>padus</i>	631
<i>Plantago</i>	564	<i>salicina</i>	631
<i>depressa</i>	661	<i>sibirica</i>	631
<i>lessingii</i>	661	<i>stipulacea</i>	631
<i>major</i>	662	<i>tangutica</i>	631

	Page		Page
<i>Prunus tomentosa</i>	631	<i>Salix melea</i>	606
<i>triloba multiplex</i>	631	<i>microstachya</i>	606
<i>Pterocephalus hookeri</i>	666	<i>paraplesia</i>	606
<i>Puccinia porri</i>	602	<i>phylicifolia</i>	606
<i>Pyrola rotundifolia chinensis</i> 590, 648		<i>plocotricha</i>	606
<i>Pyrus pashia</i>	631	<i>spathulifolia</i>	606
<i>Quercus mongolica</i>	608	<i>wallichiana</i>	607
<i>Ranunculaceae</i>	564, 614	<i>wuiana</i>	607
<i>Ranunculus affinis</i>	617	<i>Salsola arbuscula</i>	612
<i>capillaceus</i>	618	<i>kali</i>	612
<i>arcuans</i>	618	<i>Salvia przewalskii</i>	657
<i>hirtellus</i>	618	<i>roborowskii</i>	657
<i>kamchaticus</i>	617	<i>Sambucus adnata</i>	664
<i>plantaginifolius</i>	618	<i>wightiana</i>	664
<i>pulchellus</i>	618	<i>Sanguisorba officinalis</i>	633
<i>Raphanus sativus</i>	623	<i>Sapindaceae</i>	643
<i>Rehmannia glutinosa</i>	660	<i>Saussurea</i>	564, 588
<i>Rhamnaceae</i>	643	<i>acroura</i>	672
<i>Rhamnus leptophyllus</i>	643	<i>chingiana</i>	672
<i>parvifolius</i>	643	<i>graminea ortholepis</i>	673
<i>Rheum delavayi</i>	611	<i>japonica</i>	673
<i>leucorrhizum</i>	611	<i>kansuensis</i>	673
<i>Rhododendron</i>	587	<i>katochaete</i>	673
<i>agglutinatum</i>	591, 648	<i>likiangensis siningensis</i>	673
<i>anthopogonoides</i>	591, 648	<i>otophylla</i>	673
<i>capitatum</i>	591, 648	<i>parviflora cuspidata</i>	673
<i>rufum</i>	586, 592, 648	<i>phaeantha</i>	673
<i>thymifolium</i>	591, 648	<i>runcianta dentata</i>	673
<i>Ribes</i>	587, 591	<i>stella</i>	673
<i>emodense verruculosum</i>	627	<i>superba</i>	673
<i>giraldii</i>	627	<i>ussuriensis</i>	674
<i>meyeri</i>	627	<i>Saxifraga atrata</i>	626
<i>pulchellum</i>	627	<i>egregia</i>	626
<i>stenocarpum</i>	627	<i>giraldiana biondiana</i>	626
<i>Rosa</i>	587, 591	<i>montana</i>	626
<i>bella</i>	631	<i>pseudohirculus</i>	626
<i>davidii</i>	593, 632	<i>tangutica minutiflora</i>	626
<i>omeiensis</i>	632	<i>Saxifragaceae</i>	625
<i>rugosa chamissoniana rubro-</i>		<i>Scirpus maritimus</i>	600
<i>plena</i>	632	<i>Scorzonera austriaca</i>	674
<i>willmottiae</i>	632	<i>capito</i>	674
<i>xanthina</i>	589	<i>divaricata</i>	674
<i>spontanea</i>	632	<i>mongolica</i>	674
<i>Rosaceae</i>	627	<i>Scrofella chinensis</i>	660
<i>Rubia cordifolia</i>	662	<i>Scrophularia alaschanica</i>	660
<i>Rubiaceae</i>	662	<i>delavayi</i>	660
<i>Rubus</i>	587, 592	<i>incisa</i>	660
<i>amabilis</i>	632	<i>Scrophulariaceae</i>	564, 658
<i>idaeus</i>	632	<i>Scutellaria baikalensis</i>	657
<i>parvifolius</i>	632	<i>rivularis</i>	657
<i>pileatus</i>	632	<i>Securinega ramiflora</i>	642
<i>pungens</i>	632	<i>Sedum</i>	564
<i>stans</i>	632	<i>aizoon angustifolia</i>	624
<i>xanthocarpus</i>	633	<i>crassipes</i>	624
<i>Rumex</i>	564	<i>dumulosum</i>	624
<i>crispus</i>	611	<i>elatinoides</i>	624
<i>gmelini</i>	611	<i>fimbriatum</i>	624
<i>nepalensis</i>	611	<i>quadrifidum fastigiatum</i>	624
<i>Rutaceae</i>	641	<i>roseum</i>	625
<i>Salicaceae</i>	605	<i>telephium angustum</i>	625
<i>Salix</i>	564, 587, 589, 591	<i>Semiaquilegia simulatrix</i>	615
<i>caprea</i>	605, 607	<i>Senecio acerifolius</i>	675
<i>cheilophila</i>	606	<i>argunensis</i>	674
<i>chingiana</i>	606	<i>kaschkarowi</i>	674
<i>dissa</i>	606	<i>nemorensis</i>	674
<i>matsudana</i>	586, 606	<i>roborowskii</i>	674

	Page		Page
<i>Senecio thianschanicus</i>	675	<i>Thalictrum simplex affine</i>	619
<i>winklerianus</i>	675	<i>Thermopsis lanceolata</i>	639
<i>Serratula centauroides</i>	675	<i>Thlaspi arvense</i> 622,	624
<i>Setaria viridis</i>	598	<i>Thuja orientalis</i>	595
<i>Sibbaldia procumbens</i>	633	<i>Thymelaeaceae</i>	645
<i>Sibiraea</i>	587	<i>Thymus serpyllum mongolicus</i> ..	657
<i>laevigata angustata</i> .. 591, 592,	633	<i>Tilia chinensis</i> 593,	644
<i>Silene conoidea</i>	613	<i>Tiliaceae</i>	644
<i>repens</i>	614	<i>Tofieldia yunnanensis</i>	604
<i>tenuis</i>	614	<i>Tongoloa elata</i>	647
<i>Smilax stans</i>	603	<i>Torularia humilis hygrophila</i> ...	624
<i>Solanaceae</i>	658	<i>piasezkii</i>	624
<i>Solanum nigrum</i>	658	<i>Trachomitum venetum</i>	653
<i>septemlobum</i>	658	<i>Tribulus terrestris</i>	641
<i>Sonchus brachyotus</i>	675	<i>Triglochin maritimum</i>	595
<i>Sophora alopecuroides</i>	639	<i>palustre</i> 595,	600
<i>Sorbaria</i>	587	<i>Triosteum hirsutum</i>	664
<i>arborea</i> 591,	633	<i>Trisetum spicatum</i> 596,	599
<i>glabrata</i>	633	<i>Trollius pumilus</i>	619
<i>Sorbus</i> 587, 591		<i>Typha minima</i>	595
<i>hupehensis</i>	633	<i>Typhaceae</i>	595
<i>koehneana</i>	633	<i>Ulmaceae</i>	608
<i>tapashana</i>	633	<i>Ulmus</i>	587
<i>Soroseris hookeriana erysimoides</i> ..	675	<i>davidiana</i>	608
<i>Spiraea</i> 589		<i>glaucescens</i> 589,	608
<i>canescens glaucophylla</i>	633	<i>lasiocarpa</i>	608
<i>fritschiana</i>	634	<i>japonica</i>	608
<i>gemmata</i>	634	<i>macrocarpa</i> 608,	609
<i>hypericifolia</i>	634	<i>pumila</i> 586, 608,	609
<i>longigemmis</i>	634	<i>Umbelliferae</i>	646
<i>Spiranthes sinensis</i>	605	<i>Urtica laetevirens</i>	609
<i>Stachys baikalensis</i>	657	<i>triangularis</i>	609
<i>Statice aurea</i>	650	<i>Urticaceae</i>	609
<i>bicolor</i>	650	<i>Valeriana officinalis</i>	665
<i>schrenkiana aff.</i>	650	<i>rupestris</i>	665
<i>Stellaria graminea</i>	614	<i>tangutica</i>	665
<i>pilosula</i>	614	<i>Valerianaceae</i>	665
<i>infracta</i>	614	<i>Verbenaceae</i>	655
<i>Stellera chamaejasme</i>	645	<i>Veronica anagallis</i>	660
<i>Stereosanthus sp.</i>	675	<i>ciliata</i>	660
<i>Stipa breviflora</i>	598	<i>tournefortii</i>	660
<i>chingii</i>	598	<i>Viburnum</i>	587
<i>inebrians</i>	599	<i>fragrans</i>	664
<i>purpurascens</i>	598	<i>lobophyllum</i> 593,	664
<i>sibirica</i>	598	<i>mongolicum</i>	664
<i>splendens</i>	599	<i>opulus</i> 593,	664
<i>Streptopus amplexifolius</i>	603	<i>veitchii</i>	664
<i>Suaeda obtusifolia</i>	612	<i>Vicia amoena</i>	639
<i>stauntonii</i>	612	<i>cracca</i>	639
<i>Swainsona salsula</i>	639	<i>sativa</i>	639
<i>Swertia pusilla</i>	653	<i>tridentata</i>	639
<i>spp.</i>	653	<i>unijuga</i>	639
<i>Syringa</i> 587		<i>Viola</i>	564
<i>oblata</i>	650	<i>biflora</i>	645
<i>alba</i> 589,	650	<i>chingiana</i>	645
<i>giraldii</i> 589,	650	<i>pinnata multifida</i>	645
<i>pekinensis</i>	651	<i>prionantha</i>	645
<i>Tamaricaceae</i>	644	<i>Violaceae</i>	645
<i>Tamarix chinensis</i> 592,	644	<i>Viscum album</i> 593,	609
<i>Taraxacum calanthodium</i>	675	<i>Vitaceae</i>	643
<i>dissectum</i>	675	<i>Xanthoceros sorbifolia</i> 590,	643
<i>Thalictrum baicalense</i>	618	<i>Zizyphus</i>	586
<i>javanicum</i>	618	<i>jujuba</i>	643
<i>petaloideum</i>	618	<i>Zygophyllaceae</i>	640
<i>przewalskii</i>	618	<i>Zygophyllum mucronatum</i>	641
<i>simplex</i>	618	<i>xanthoxylum</i> 636,	641

INDEX

[Synonyms in italics. Page numbers of principal entries in boldface]

	Page		Page
Abelia	587	<i>Anastrophus</i>	6, 7
<i>zanderi</i>	592, 662	<i>compressus</i>	7
Abies sutchuenensis	592, 593	<i>paspaloides</i>	48
Acanthopanax giraldii	646	<i>pectinatus</i>	24
<i>pilosulus</i>	646	Androsace	590
Acanthophora spicifera	559	<i>erecta</i>	649
Acer	587, 593	<i>mariae tibetica</i>	649
<i>davidi</i>	590, 642	<i>saxifragaefolia</i> aff.	649
<i>ginnala</i>	642	Anemone	590
<i>maximowiczii</i>	643	<i>japonica tomentosa</i>	615
<i>tetramerum betulifolium</i>	590, 643	<i>narcissifolia</i>	615
Aceraceae	642	<i>rivularis</i>	615
Achillea	564	<i>rupestris</i> aff.	615
<i>ptarmica</i>	666	Angelica wulsiniana	646
Aconitum	587	Anisodus tanguticus	658
<i>excelsum</i>	614	Anthopterus	313, 324, 332, 406
<i>gymnandrum</i>	614	<i>bracteatus</i>	409
<i>szechenyianum</i>	614	<i>calycinus</i>	351
<i>tanguticum</i>	614	<i>cuneatus</i>	407
<i>volubile</i>	614	<i>mucronatus</i>	409
Actinidiaceae	644	<i>pearcei</i>	446
Adenophora polymorpha	666	<i>racemosus</i>	407
<i>potaninii</i>	666	<i>taxifolius</i>	445
Agapetes	316	<i>wardii</i>	408 , 409
Agathothibaudia	323, 324, 333, 410, 415	Apocynaceae	653
Agrimonia eupatoria	627	Aquilegia ecalcarata	615
Agrostis hugoniana	596	<i>viridiflora</i>	615
Ajuga lupulina	655	Arabis alaschanica	622
<i>ovalifolia</i>	655	<i>hirsuta</i>	622
Aletris glabra	602	<i>pendula</i>	622
Allium chrysanthum	602	Araceae	600
<i>cyaneum</i>	602	Araliaceae	564, 646
<i>forrestii</i>	602	Arctous alpinus	648
<i>henryi</i>	602	Arenaria cerastiformis	612
<i>kansuense</i>	602	<i>holosteoides</i>	612
<i>rubellum</i>	602	<i>kansuensis</i>	613
<i>tenuissimum</i>	602	<i>przewalski</i>	613
<i>victoralis</i>	602	Arisaema consanguineum	600
Ampelopsis japonica	643	Arnebia szechenyii	654
Amphicarpon	162	Arrayán	526
Amphiroa fragilissima	557	Artemisia codonocephala	667
Anachyris	8, 228	<i>mattfeldii etomentosa</i>	667
<i>paspaloides</i>	8, 228	<i>shansiensis</i>	667
<i>setaria</i>	229	<i>sieversiana</i>	667
Anachyrium	8	<i>umbrosa</i>	667
Anadyomene stellata	552	<i>vestita</i>	667
Anaphalis	588	Arthrophytum arborescens	611 , 661
<i>alata</i>	666	Arundinaria sp.	596
<i>aureo-punctata</i>	667	Arundinella anomala	596
<i>lactea</i>	667	Asclepiadaceae	653
<i>margaritacea</i>	667	Asparagus brachyphyllus	603
<i>angustifolia</i>	667	<i>trichophyllus</i>	603
<i>cinnamomea</i>	667	Asperococcaceae	554

	Page		Page
<i>Asperugo procumbens</i>	654	<i>Buddleia alternifolia</i>	651
<i>Aster</i>	564, 588	<i>Bull-grass</i>	4, 227
<i>ageratoides adustus</i>	668	<i>Bull-paspalum</i>	4, 227
<i>altaicus</i>	668	<i>Bupleurum</i> spp.....	646
<i>alyssoides achnolepis</i>	668	<i>Cabrera</i>	6, 7
<i>crenatifolius</i>	668	<i>Cacaguito</i>	377
<i>flaccidus</i>	668	<i>Cacalia deltophylla</i>	668
<i>poliothamnus</i>	668	<i>Calamagrostis epigeios</i>	596
<i>vilmorini</i>	668	<i>scabrescens</i>	596
<i>Asterocytis ramosa</i>	555	<i>Calothrix confervicola</i>	552
<i>Astragalus</i>	564, 587	<i>Caltha scaposa</i>	615
<i>adsurgens</i>	634	<i>Camalote negro</i>	178
<i>chingianus</i>	634	<i>Campanula aristata</i>	666
<i>chrysopterus</i>	634	<i>Campanulaceae</i>	666
<i>discolor</i>	634	<i>Cancerinia maximowiczii</i>	668
<i>floridus</i>	634	<i>Cannabis sativa</i>	609
<i>hoantchy</i>	634	<i>Capim milhã grande</i>	174
<i>hypogaeus aff</i>	635	<i>Caprifoliaceae</i>	662
<i>longilobus</i>	635	<i>Capriola</i>	6
<i>melilotoides</i>	635	<i>Capsella bursa-pastoris</i>	622
<i>monadelphus</i>	635	<i>Caragana</i>	587, 589, 590
<i>przewalskii</i>	635	<i>brevifolia</i>	636
<i>variabilis</i>	635	<i>jubata</i>	586, 590, 636
<i>Atraphaxis lanceolatum</i>	610	<i>maximowicziana</i>	636
<i>Avena altior</i>	596	<i>opulens</i>	636
<i>suffusca</i>	596	<i>pygmaea</i>	636
<i>Axonopus</i>	6, 7	<i>roborovskyi</i>	636
<i>aureus</i>	7	<i>tangutica</i>	590, 636
<i>compressus</i>	7	<i>tibetica</i>	636
<i>furcatus</i>	46, 48	<i>Cardamine macrophylla</i>	622
<i>Bahia grass</i>	5, 65	<i>tangutorum</i>	622
<i>Balanophora</i> sp.....	609	<i>Carduus acanthoides</i>	668
<i>Balanophoraceae</i>	609	<i>Carex</i>	564
<i>Balsaminaceae</i>	643	<i>atrata</i>	599
<i>Bangiaceae</i>	555	<i>pullata</i>	599
<i>Batrachium flavidum</i>	615	<i>caespitosa</i>	599
<i>Beckmannia erucaeformis</i>	596	<i>dielsiana</i>	599
<i>Berberidaceae</i>	619	<i>pallida</i>	599
<i>Berberis</i>	587, 589, 592	<i>stenophylla</i>	600
<i>boschanii</i>	619	<i>Carum carvi</i>	646
<i>brachypoda</i>	619	<i>Caryophyllaceae</i>	612
<i>diaphana</i>	619	<i>Caryopteris mongholica</i>	655
<i>kansuensis</i>	619	<i>tangutica</i>	655
<i>parvifolia</i>	619	<i>Caulerpa crassifolia</i>	553
<i>purdomii</i>	619	<i>racemosa clavifera</i>	554
<i>vernae</i>	620	<i>microphysa</i>	553
<i>Betula</i>	587	<i>sertularioides brevipes</i>	554
<i>albo-sinensis</i>	590, 607	<i>farlowii</i>	554
<i>septentrionalis</i>	590, 607	<i>Caulerpaceae</i>	553
<i>japonica</i>	590, 607	<i>Cavendishia</i>	312,
<i>Betulaceae</i>	607	313, 315, 318, 321, 323, 324,	
<i>Biebersteinia heterostemon</i>	640	327, 330, 331, 333, 347, 430,	
<i>Bignoniaceae</i>	661	438, 439, 446, 512.	
<i>Biramia</i>	360	<i>acuminata</i>	503, 506, 509
<i>tuberosa</i>	369	<i>adenophora</i>	473
<i>Boraginaceae</i>	564, 654	<i>alata</i>	509
<i>Boschniakia</i> sp.....	661	<i>amalfiensis</i>	472
<i>Boton-boton</i>	492	<i>angustifolia</i>	498
<i>Brachiaria distachya</i>	163	<i>axillaris</i>	493
<i>extensa</i>	240	<i>beckmanniana</i>	491
<i>grossaria</i>	108	<i>benthamiana</i>	503
<i>Brachypodium sylvaticum</i>	596	<i>bomareoides</i>	470
<i>Brassica juncea</i>	622	<i>bracteata</i>	489, 490, 505
<i>Bromus tectorum</i>	596	<i>bullata</i>	453
<i>Bryopsidaceae</i>	553	<i>callista</i>	451
<i>Bryopsis pennata</i>	553	<i>capitata</i>	507, 508
<i>Bryothamnion triquetrum</i>	559	<i>capitulata</i>	450

	Page		Page
<i>Cavendishia caudata</i>	496	<i>Cavendishia subamplexicaulis</i> ...	478
<i>chiapensis</i>	458, 463	<i>tarapotana</i>	476
<i>compacta</i>	468	<i>tuerckheimii</i>	456
<i>complectens</i>	448, 468	<i>ulbrichiana</i>	490
<i>cordata</i>	487	<i>ulei</i>	506
<i>cordifolia</i>	487, 490, 493, 505	<i>urbaniana</i>	508
<i>costaricensis</i>	461	<i>urichiana</i>	393
<i>crassifolia</i>	439, 457	<i>venosa</i>	474
<i>divaricata</i>	481	<i>veraguensis</i>	461
<i>duidae</i>	473	<i>warszewiczii</i>	463
<i>durifolia</i>	493	<i>weberbaueri</i>	505, 506
<i>endresii</i>	455	<i>wercklei</i>	455
<i>engleriana</i>	477	Celastraceae.....	642
<i>gilgiana</i>	477	<i>Centaurea picris</i>	668
<i>glandulosa</i>	497	<i>Centroceras clavulatum</i>	559
<i>glutinosa</i>	455	Ceramiaceae.....	559
<i>gracilis</i>	501	<i>Cerastium vulgatum</i>	613
<i>graebneriana</i>	454	<i>Ceratostema</i>	312,
<i>grandifolia</i>	476	313, 314, 315, 317, 324, 327, 328,	
<i>guatapeensis</i>	494	329, 332, 333, 335, 352, 355, 445.	
<i>guatemalensis</i>	459	<i>andreanum</i>	347
<i>hartwegiana</i>	489, 490	<i>biflorum</i>	435
<i>hendersoni</i>	504	<i>buxifolium</i>	328, 340
<i>hispida</i>	469	<i>calycinum</i>	351
<i>hoffmannii</i>	462	<i>chillacochense</i>	347
<i>kalbreyeri</i>	478	<i>coccineum</i>	328, 338
<i>killipii</i>	483	<i>cordifolium</i>	339
<i>klotzschiana</i>	454	<i>coronarium</i>	328, 344
<i>kraenzliniana</i>	480	<i>ellipticum</i>	356
<i>latifolia</i>	459	<i>emarginatum</i>	347
<i>laurifolia</i>	439, 456	<i>graebnerianum</i>	328,
<i>lehmannii</i>	500	341, 342, 343	
<i>lindauiana</i>	469, 470	<i>grandiflorum</i>	328, 338
<i>longiflora</i>	452, 470	<i>harmsianum</i>	328, 340, 347
<i>macrocephala</i>	475	<i>hirsutum</i>	328, 339
<i>marginata</i>	499	<i>hookeri</i>	356
<i>melastomoides</i> Hemsl.	454, 503	<i>karstenianum</i>	348
<i>melastomoides</i> Hoer.	503	<i>lanceolatum</i>	328, 344
<i>miconioides</i>	454, 503	<i>lobbii</i>	328, 337
<i>montana</i>	492	<i>longiflorum</i>	338
<i>muschleriana</i>	482	<i>loranthiflorum</i>	352
<i>nobilis</i>	446, 508	<i>mandoni</i>	328, 342
<i>obtusa</i>	498	<i>microphyllum</i>	328, 341
<i>oligantha</i>	496	<i>nutans</i>	423
<i>paniculata</i>	482	<i>oblongifolium</i>	347
<i>peruviana</i>	484	<i>odoratissimum</i>	495
<i>pilgeriana</i>	504, 505	<i>parvifolium</i>	328, 346, 428
<i>pseudopubescens</i>	502	<i>peruvianum</i>	312, 328, 347
<i>pterocarpa</i>	449	<i>pilgerianum</i>	342, 343
<i>pubescens</i>	460, 484, 485, 487	<i>portoricense</i>	354
<i>boliviensis</i>	487	<i>pubiflorum</i>	328, 346
<i>microphylla</i>	487	<i>rigidum</i>	328, 345
<i>punctatifolia</i>	480	<i>salapa</i>	372
<i>purdiei</i>	472, 475	<i>sanguineum</i>	342
<i>quercina</i>	450	<i>serratum</i>	416
<i>quereme</i>	446, 457, 495	<i>smilacifolium</i>	354
<i>rigidifolia</i>	500	<i>speciosum</i>	328, 345
<i>scabriuscula</i>	490	<i>spectabile</i>	328, 343
<i>secundiflora</i>	504, 505	<i>ulei</i>	423
<i>sessiliflora</i>	483	<i>urbanianum</i>	338
<i>sillarensis</i>	487	<i>weberbaueri</i>	356, 357
<i>smithii</i>	460	<i>Ceresia</i>	8
<i>spicata</i>	479	<i>Ceresia</i> , subgenus.....	7, 15
<i>splachnoides</i>	471	<i>elegans</i>	8
<i>splendens</i>	505	<i>fluitans</i>	8, 32
<i>strobilifera</i>	509	Chaetangiaceae.....	556

	Page		Page
Chaetochloa	3	Clematis	590
Chaetomorpha brachygona	553	aethusifolia	616
fascicularis	553	alpina	616
Chamaenerion angustifolium	646	brevicaudata	616
Chamaerhodos erecta	627	glauca akebioides	616
Chaqui-lulu	382	grata	616
Chenopodiaceae	611	macropetala	616
Chenopodium botrys	612	nannophylla	616
hybridum	612	tangutica	616
Chloris virgata	597	Clematoclethra actinidioides	644
Chlorophyceae	552	integrifolia	644
Chrysanthemum lavandulaefoli-		Clintonia udensis	603
um	669	Cobresia schoenoides	600
mutellina	669	Codiaceae	554
naktongense	669	Codonopsis ussuriensis	666
nematolobum	669	viridiflora	666
pulvinatum	669	Colmillo	316, 378, 393, 526
salicifolium	669	Colpomenia sinuosa	554
Chrysosplenium	564	Coluria longifolia	637
axillare	625	Compositae	564, 666
chamaedryoides	625	Convolvulaceae	654
chingii	625	Convolvulus arvensis	654
griffithii	625	tragacanthoides	654
guebriantianum	625	Coral	404, 489, 506
nudicaule	625	Coralito	420
Chupalon	312, 446	Corallina cubensis	557
acuminatum	503	Corallinaceae	556
alatum	509	Corallineae	557
benthamianum	503	Cornaceae	647
bracteatum	490	Cornus	587
capitatum	507	bretschneideri	647
complectens	448	macrophylla	647
cordatum	487	poliophylla	647
cordifolium	487	Cortaderia	4
crassifolium	457	Cortedero	198
endresii	455	Corydalis	564, 587
formosum	420	adunca	620
guianense	399	albicaulis	621
hartwegianum	489	chingii	621
latifolium	459	dasyptera	621
laurifolium	456	hannae	621
leucostomum	399	impatiens	621
melastomoides	454	kansuana	621
nobile	508	linarioides	621
penduliflorum	403	pauciflora holanschanica	621
pseudopubescens	502	rosea	621
pubescens	485	scaphopetala	621
quereme	495	Corylus	587
scabriusculum	490	sieboldiana mandschurica	599, 607
splendens	505	Cotoneaster	587, 589, 592
strobiliferum	509	acutifolia villosula	593, 627
tarapotanum	476	adpressa	628
turbinatum	415	ambigua	628
veraguense	461	apiculata	628
viridiflorum	482	foveolata	628
warszewiczii	463	melanocarpa	628
Cimicifuga foetida typica	615	multiflora	628
Cirsium	564	calocarpa	628
arvense mite	669	racemiflora soongorica	628
souliei	669	tomentosa	628
Cistanche salsa	661	Crassulaceae	624
Cladophora fuliginosa	553	Crataegus	587
Cladophoraceae	553	kansuensis	629
Cladophoropsis membranacea	552	Cremanthodium discoideum	669
Cleachne	7	lineare	669
		plantagineum	670

	Page		Page
<i>Crepis</i>	564, 588	<i>Dimorphostachys oajacensis</i>	47
<i>flexuosa</i>	670	<i>paspaloides</i>	110
<i>Cruciferae</i>	564, 622	<i>pedunculata</i>	92
<i>Cupressaceae</i>	594	<i>pilosa</i>	98
<i>Cuscuta chinensis</i>	654	<i>schaffneri</i>	107, 108, 109
<i>Cuscutaceae</i>	654	<i>remotiuscula</i>	107
<i>Cyananthus hookeri hispidus</i>	666	<i>variabilis</i>	108, 109
<i>Cymatochloa</i>	8	<i>Dioscorea quinqueloba</i>	604
<i>fluitans</i>	8, 32	<i>Dioscoreaceae</i>	604
<i>pyramidalis</i>	33	<i>Dipsacaceae</i>	665
<i>repens</i>	8, 33	<i>Dipsacus asper</i>	665
<i>Cymbaria mongolica</i>	658	<i>Disterigma</i>	320
<i>Cymodocea manatorum</i>	557	<i>Draba eriopoda</i>	623
<i>Cymopolia barbata</i>	553	<i>lanceolata chingii</i>	623
<i>Cynanchum chinense</i>	653	<i>leiocarpa</i>	623
<i>mongolicum</i>	654	<i>nemorosa</i>	623
<i>sibiricum</i>	654	<i>Dracocephalum heterophyllum</i>	655
<i>Cynodon</i>	6	<i>imberbe</i>	656
<i>dactylon</i>	9, 160	<i>sibiricum</i>	656
<i>Cyperaceae</i>	599	<i>tanguticum</i>	656
<i>Cypripedium fasciolatum</i>	604	<i>Echinochloa walteri</i>	40
<i>Dallis grass</i>	4, 170	<i>Elaeagnaceae</i>	645
<i>Daphne</i>	587	<i>Elaeagnus</i>	587
<i>giraldii</i>	591, 645	<i>angustifolia</i>	586, 645
<i>tangutica</i>	645	<i>umbellata</i>	593, 646
<i>Dasycladaceae</i>	553	<i>Elephant grass</i>	3
<i>Delphinium</i>	587	<i>Elsholtzia cristata</i>	656
<i>grandiflorum</i>	616	<i>densa</i>	656
<i>henryi</i>	616	<i>eristachya</i>	656
<i>labrangense</i>	617	<i>Elymus dahuricus</i>	597
<i>tanguticum</i>	617	<i>dasystachys</i>	597
<i>tongolense</i>	617	<i>sibiricus</i>	597
<i>Deschampsia caespitosa</i>	597	<i>Englerodoxa</i>	315, 329, 332, 350
<i>Descurainia sophia hygrophila</i>	622	<i>alata</i>	329, 350
<i>Deyeuxia</i> spp.....	597	<i>calycina</i>	351
<i>Dianthus chinensis</i>	613	<i>loranthiflora</i>	352
<i>superbus</i>	613	<i>Enteromorpha flexuosa</i>	552
<i>Dichothrix fucicola</i>	552	<i>Ephedra equisetina</i>	595
<i>Dictamnus fraxinella</i>	641	<i>intermedia</i>	595
<i>Dictyopteris delicatula</i>	554	<i>monosperma</i>	595
<i>Dictyosphaeria cavernosa</i>	553	<i>Epilobium tanguticum</i>	646
<i>favulosa</i>	553	<i>Epimedium sagittatum</i>	620
<i>Dictyota cervicornis</i>	555	<i>Episcopia pendula</i>	441
<i>dentata</i>	555	<i>Eremachyrion</i> , section <i>Paspalum</i>	228
<i>divaricata</i>	555	<i>Ericaceae</i>	648
<i>Dictyotaceae</i>	554	<i>Erigeron acris</i>	670
<i>Digenia</i>	552	<i>Eriochloa</i>	6
<i>simplex</i>	559	<i>sericea</i>	233
<i>Digitaria</i>	6, 8	<i>Eritrichium pectinatum</i>	654
<i>conjugata</i>	163	<i>Erodium stephanianum</i>	640
<i>dilatata</i>	170	<i>Eruca sativa lativalvis eriocarpa</i>	623
<i>disticha</i>	48	<i>Euphorbia esula</i>	641
<i>foliosa</i>	41	<i>humifusa</i>	641
<i>longiflora</i>	43	<i>macrorrhiza</i>	641
<i>paspalodes</i>	46, 47, 48	<i>Euphorbiaceae</i>	641
<i>sanguinalis</i>	9	<i>Euphrasia officinalis</i>	658
<i>tristachya</i>	41	<i>tatarica</i>	658
<i>Dilophia fontana</i>	622	<i>Eurotia ceratoides</i>	612
<i>Dilophus guineensis</i>	555	<i>Eurygania</i>	314, 323, 410
<i>Dimorphostachys</i>	7, 8, 10	<i>angustifolia</i>	431
<i>adoperiens</i>	102	<i>biflora</i>	435
<i>botterii</i>	110	<i>elliptica</i>	356
<i>ciliifera</i>	105, 106	<i>multiflora</i>	437
<i>drummondii</i>	104, 105, 106	<i>ovata</i>	433
<i>ghiesbreghtii</i>	108, 109	<i>parvifolia</i>	428
<i>langei</i>	105	<i>phyllireaefolia</i>	430
<i>monostachya</i>	8, 98	<i>subcrenulata</i>	439

	Page		Page
<i>Eutrema compactum</i>	623	<i>Gracilaria ferox</i>	558
<i>Evonymus</i>	587	<i>mamillaris</i>	558
<i>amygdalifolia</i>	642	Gracilariaceae.....	558
<i>giraldii angustialata</i>	642	Gramineae.....	564, 596
<i>nanoides</i>	642	<i>Grateloupia cuneifolia</i>	558
<i>nanus</i>	642	Grateloupiaceae.....	558
<i>phellomana</i>	642	Grossulariaceae.....	627
<i>przewalskii</i>	642	<i>Gueldenstaedtia diversifolia</i>	637
Fagaceae.....	608	<i>Gypsophila davurica</i>	613
<i>Fedia rupestris</i>	665	<i>gmelini</i>	613
<i>Ferula</i> sp.....	647	<i>Habenaria bifolia</i>	604
<i>Findlaya</i>	314, 509, 516	<i>conopsea</i>	604
<i>apophysata</i>	516	<i>cucullata</i>	604
Finger grasses.....	9	Hackel, Eduard, herbarium of.....	1
Floating-paspalum.....	5	<i>Halenia elliptica</i>	653
Forage grasses.....	4,	<i>Halimeda opuntia</i>	554
5, 33, 49, 56, 59, 65, 84, 170, 174,		<i>simulans</i>	554
178, 180, 183, 185, 227.		<i>tuna</i>	554
Fort Thompson grass.....	5, 49	<i>Halopeplis</i> sp.....	612
<i>Fosliella farinosa</i>	557	<i>Haplophyllum tragacanthoides</i>	641
<i>solmsiana</i>	556	<i>Harpostachys</i> section of <i>Panicum</i>	91
<i>lejolisi</i>	557	<i>Hedysarum multijugum</i>	637
Fournier, date of Mexican plants.....	20	<i>polybotrys</i>	637
Foxtail millet.....	3	<i>pumilum</i>	637
<i>Fragaria vesca</i>	629	<i>Heracleum barbatum</i>	647
Fucaceae.....	555	<i>millefolium</i>	647
Fumariaceae.....	620	Herbarium, Hackel.....	1
<i>Galaxaura cylindrica</i>	556	Caen, Institut Botanique.....	1
<i>squalida</i>	556	Freiburg, Botanische Insti- tut.....	1
<i>subverticillata</i>	556	Leiden, Rijks Herbarium.....	1
<i>Galeopsis tetrahit</i>	656	Montpellier, Institut Bota- nique.....	1
<i>Galium boreale</i>	662	Pisa, University.....	1
<i>verum</i>	662	<i>Herminium tanguticum</i>	605
<i>Gamalote</i>	178	<i>Herposiphonia tenella</i>	559
Gelidiaceae.....	556	<i>Hippophaë rhamnoides procera</i>	590, 645
<i>Gelidiella acerosa</i>	556	<i>Hololachna songarica</i>	644
<i>Gelidium rigidum</i>	556	<i>Hordeum nodosum</i>	597
<i>Gentiana</i>	587, 588	<i>Hornemannia</i>	320
<i>chingii</i>	651	<i>boliviensis</i>	437
<i>dahurica</i>	651	<i>smilacifolia</i>	354
<i>farreri</i>	651	Hualicon.....	316, 382, 505
<i>grumii</i>	651	<i>Humulus lupulus</i>	609
<i>hexaphylla caudata</i>	652	<i>Hydrangea</i>	587
<i>leucomelaena</i>	652	<i>bretschneideri</i>	591, 625
<i>officinalis</i>	652	<i>Hydroclathrus clathratus</i>	554
<i>przewalskii</i>	652	<i>Hyoscyamus niger</i>	658
<i>siphonantha latifolia</i>	652	<i>Hyparrhenia hirta</i>	9
<i>squarrosa</i>	652	<i>Hypecoum leptocarpum</i>	620
<i>straminea</i>	652	Hypericaceae.....	644
<i>striata</i>	652	<i>Hypericum monanthemum</i> aff.....	644
Gentianaceae.....	564, 651	<i>Hypnea cervicornis</i>	558
<i>Gentianella</i> spp.....	653	<i>musciiformis</i>	558
Geraniaceae.....	640	Hypneaceae.....	558
<i>Geranium eriostemon</i>	640	Impatiens.....	643
<i>pratense</i>	640	Imperata.....	9
<i>pylzwianum</i>	640	<i>brasiliensis</i>	9
<i>sibiricum</i>	640	<i>caudata</i>	237
<i>Gerbera anandria</i>	670	<i>hookeri</i>	9
<i>Geum strictum</i>	629	<i>Incarvillea compacta</i>	661
<i>Glaux maritima</i>	649	<i>sinensis</i>	661
<i>Glycyrrhiza uralensis</i>	637	<i>variabilis</i>	661
Gnetaceae.....	595	<i>Inula brittanica chinensis</i>	670
<i>Gonocalyx</i>	314, 329, 352	<i>racemosa</i>	670
<i>portoricensis</i>	354	<i>salsoloides</i>	670
<i>pulcher</i>	329, 353		
<i>smilacifolius</i>	354		

	Page		Page
Iridaceae	604	Ligusticum pilgerianum	647
Iris ensata	604	Liliaceae	564, 602
polysticta	604	Lithophyllum pustulatum	556
tenuifolia	604	Lithothamnion incertum	556
ventricosa	604	occidentale	556
Ixeris	564	Lloydia tibetica purpurascens	603
chinensis	670	Loganiaceae	651
denticulata elegans	670	Lonicera	587, 590, 591, 592
sonchifolia	670	caerulea	662
Jania adherens	558	chrysantha	662
capillacea	558	ferdinandi	662
pumila	558	heteroloba	662
Jointgrass	5, 49	hispida	663
Joyapa	375, 505	inconspicua	663
Juglandaceae	607	microphylla	663
Juglans regia	590, 607	gracilior	663
Juncaceae	600	nervosa	663
Juncaginaceae	595	syringantha	663
Juncus allioides	600	tangutica	663
bufonius	600	thibetica	663
castaneus	600	trichosantha	664
exploratorium	600	Loranthaceae	609
giganteus	600	Lychnis apetala	613
luzuliformis potanini	602	Lycium chinense	658
Juniperus	587, 591	Lycopsis orientalis	655
chinensis	594	Lysiclesia	327, 329, 330, 331, 333, 517
pseudosabina	592, 594	caudata	518
rigida	589, 594	minor	519
saltuaria	592, 594	Macleania	313, 321, 323, 325, 326, 327, 332, 359, 360, 384, 404
squamata	592, 594	alpicola	376, 377
fargesii	592, 595	amplexicaulis	367
Kalidium foliatum	612	angulata	365
Knotgrass	5, 49	antioQUIAE	364
Koenigia islandica	610	arcuata	378
Labiatae	655	attenuata	379
Lactuca sp.	671	benthamiana	374
Lamium amplexicaule	656	colorata	369
Lancea tibetica	658	compacta	369
Lappula redowskii	655	cordata	369, 370
Larix	587	linearifolia	368
potanini	586, 592, 593	cordifolia	325, 366, 370, 384
Lateropora	319, 321, 330, 331, 333	costaricensis	377
ovata	334	crassa	373
Lathyrus pratensis	637	crenulata	384
Laurencia obtusa	559	ecuadorensis	380
papillosa	559	elliptica Hoer	381
LeConte, types of	32	elliptica Rusby	395
Leguminosae	634	euryphylla	373
Leontopodium calocephalum uliginosum	671	farinosa	383
leontopodioides	671	floribunda Benth	374
linearifolium	671	floribunda Hook	325, 326, 363, 365
Leonurus lanatus	656	glabra	325, 377
sibiricus	656	hirtiflora	382
Lepidium apetalum	623	humboldtiana	441, 442
latifolium sibiricum	623	insignis	369
Leptodermis sp.	662	irazuensis	377, 378
Leptopyrum fumarioides	617	kalbreyeri	403
Lespedeza	564	laurina	382
daurica	637	linearifolia	368
floribunda	638	loeseneriana	382
Ligularia achyrotricha	671	longiflora	362, 370
kansuensis	671	macrantha	363
macrodonia	671	multibracteata	374
przewalskii	671	nervosa	380
sagitta	671		
virgaurea	671		

	Page		Page
<i>Macleania nitida</i>	325,	<i>Mycerinus</i>	326, 332, 359
326, 376, 378, 379, 381, 383		<i>sclerophyllus</i>	359
<i>ovata</i>	367	<i>Myricaria germanica</i>	644
<i>pentaptera</i>	325, 326, 365	<i>Myxophyceae</i>	552
<i>pilgeriana</i>	375	<i>Napier grass</i>	3
<i>poortmanni</i>	375	<i>Nasturtium palustre</i>	623
<i>popenoei</i>	374	<i>Neothibaudia</i>	323
<i>pubiflora</i>	325, 372	<i>Nepeta macrantha</i>	657
<i>pulchra</i>	384	<i>Nitraria schoberi</i>	640
<i>punctata</i>	371	<i>Nolte, Ernst Ferdinand, herbar-</i>	
<i>puberula</i>	371	<i>ium of</i>	1
<i>recurva</i>	382	<i>Notopora</i>	314, 321, 330, 331, 334
<i>reducta</i>	380	<i>schomburgkiana</i>	335
<i>robusta</i>	378	<i>schomburgkii</i>	335
<i>rotundifolia</i>	366, 367	<i>Ochtodes secundiramea</i>	556
<i>salapa</i>	325, 326, 372, 383	<i>Odontites rubra</i>	658
<i>sodiroi</i>	376, 377	<i>Oleaceae</i>	650
<i>speciosissima</i>	370, 384	<i>Onagraceae</i>	646
<i>stricta</i>	364	<i>Orchidaceae</i>	564, 604
<i>tenuiflora</i>	362	<i>Orchis chusua</i>	605
<i>tovarensis</i>	404	<i>Oreanthos</i>	313, 329, 332, 358
<i> trianae</i>	376, 377	<i>buxifolius</i>	358
<i>tuberosa</i>	369	<i>Orobanchaceae</i>	661
<i>turrialbana</i>	377	<i>Orobanche ammophila</i>	661
<i>Maddenia hypoxantha</i>	629	<i>coerulescens typica</i>	661
<i>Maianthemum bifolium</i>	603	<i>Orobis lathyroides</i>	639
<i>Maizilla</i>	8	<i>Orthaea</i>	314,
<i>stolonifera</i>	8, 39	327, 329, 330, 331, 333, 509, 518	
<i>Malcolmia africana</i>	623	<i>abbreviata</i>	517
<i>Malus</i>	587, 589	<i>apophysata</i>	516
<i>baccata</i>	629	<i>boliviensis</i>	513
<i>kansuensis</i>	629	<i>breviflora</i>	513
<i>transitoria</i>	592, 629	<i>cavendishoides</i>	511, 514
<i>Malva verticillata</i>	644	<i>constans</i>	512
<i>Malvaceae</i>	644	<i>cordata</i>	510, 512
<i>Marrubium incisum</i>	656	<i>engleriana</i>	514, 517
<i>Maycha</i>	492	<i>hispida</i>	517
<i>Meconopsis</i>	588	<i>lehmannii</i>	495
<i>horridula racemosa</i>	620	<i>pinnatinervia</i>	515
<i>integrifolia</i>	620	<i>secundiflora</i>	509, 512, 513
<i>punicea</i>	620	<i>weberbaueri</i>	515
<i>Medicago lupulina</i>	638	<i>Oryzopsis munroi</i>	597
<i>sativa</i>	638	<i>Oscillatoriaceae</i>	552
<i>Melica scabrosa</i>	597	<i>Ostryopsis</i>	587, 589
<i>Melilotus alba</i>	638	<i> davidiana</i>	607
<i>Melobesia farinosa solmsiana</i>	556	<i>Oxycoccus</i>	312
<i>membranacea</i>	556, 557	<i>Oxygraphis glacialis</i>	617
<i>Melobesia</i>	556	<i>Oxytropis</i>	564
<i>Mentha arvensis</i>	657	<i>glabra</i>	638
<i>Messerschmidtia sibirica</i>	655	<i>imbricata</i>	638
<i>Microcoleus tenerrimus</i>	552	<i>melanocalyx</i>	638
<i>Microula myosotidea</i>	655	<i>yunnanensis aff.</i>	638
<i>trichocarpa</i>	655	<i>Padina sanctae-crucis</i>	555
<i>Milium distichum</i>	47	<i>vickersiae</i>	555
<i>latifolium</i>	39	<i>Paeonia anomala</i>	617
<i>paspalodes</i>	46, 48	<i>Panax ginseng</i>	646
<i>Millet</i>	3	<i>Panicum</i>	3, 6
<i>Moenchia</i>	8	<i>bicrurulum</i>	68
<i>speciosa</i>	8, 237	<i>bifidum</i>	233, 234
<i>Monte frutilla</i>	483	<i>conjugatum</i>	163
<i>Moraceae</i>	609	<i>cultratum</i>	98
<i>Morina alba</i>	665	<i>decumbens</i>	92
<i>chinensis</i>	665	<i>digitaria</i>	48
<i>parviflora chinensis</i>	665	<i>digitariae</i>	47
<i>Morus alba</i>	590, 609	<i>digitarioides</i>	47
<i>Muelas</i>	316, 378, 526	<i>dissectum</i>	5, 28

	Page		Page
<i>Panicum distachyum</i>	163	<i>Paspalum bakeri</i>	133
<i>drummondii</i>	105	<i>bicrurulum</i>	68
<i>fasciculatum</i>	122	<i>bicrurum</i>	163
<i>filiforme</i>	141	<i>bifidum</i>	233
<i>furcellum</i>	72	<i>biglume</i>	39
<i>humboldtianum</i>	22	<i>bistipulatum</i>	32, 33
<i>hybridum</i>	238	<i>blepharophorum</i>	22
<i>laxum</i>	160	<i>blepharophyllum</i>	87
<i>monobotrys</i>	98, 101	<i>blodgettii</i>	122, 127
<i>monostachyum</i> ... 8, 97, 98, 101, 107	107	<i>boivini</i>	95
<i>minus</i>	98	<i>boscianum</i> 4, 6, 191, 221,	224, 225, 226, 227, 228, 238
<i>obtectum</i>	22	<i>botterii</i> 53, 91, 106, 110	
<i>paniculatum</i>	123	<i>brachiatum</i>	41
<i>paspaliforme</i>	47	<i>bracteatum</i>	47
<i>plicatulum</i>	215	<i>breve</i>	155
<i>polyrrhizum</i>	47	<i>Brevia group</i>	155
<i>pseudopaspalus</i> 101, 107		<i>brevifolium</i>	239
<i>saccharoides</i> 8, 236, 237		<i>brunneum</i> 225, 226	
<i>schaffneri</i>	107	<i>buckleyanum</i>	58
<i>squamatum</i> 104, 105		<i>bushii</i>	82
<i>unispicatum</i>	100	<i>Caespitosa group</i>	126
<i>Papaver nudicaule</i>	620	<i>caespitosum</i> Flügge 127, 129, 14	
<i>Papaveraceae</i>	620	<i>longifolium</i>	129
<i>Paraquilegia</i>	588	<i>caespitosum</i> Hochst.....	224
<i>anemonoides</i>	617	<i>campestre</i> 68, 215	
<i>Parnassia</i> 587, 588		<i>candidum</i> 10, 36, 37	
<i>laxmanni</i>	626	<i>capillare</i>	239
<i>trinervis viridiflora</i>	626	<i>capillifolium</i>	148
<i>Paspalanthium</i>	8	<i>carinatum</i>	16
<i>stoloniferum</i>	8, 39	<i>carolinianum</i>	239
<i>Paspalum</i> 4, 7, 170		<i>caudicatum</i>	144
<i>abbreviatum</i> 104, 110		<i>centrale</i>	221
<i>acuminatum</i>	31	<i>ceresia</i>	8
<i>acutifolium</i>	132	<i>chapmani</i>	87
<i>acutum</i> 201, 202		<i>chepica</i>	47
<i>adoperiens</i> 101, 104, 105		<i>chinense</i>	239
<i>adpressum</i>	239	<i>chrysoblephare</i>	239
<i>affine Bello</i>	123	<i>ciliatifolium</i> 2, 3, 73,	
<i>affine Steud</i> 111, 124, 203		75, 83, 84, 86, 87, 88, 89, 90	
<i>africanum</i>	163	<i>brevifolium</i>	87
<i>alabamense</i>	233	<i>dasyphyllum</i>	79
<i>alcalinum</i>	59	<i>ciliatum</i> H. B. K.....	21, 22
<i>alternans</i>	179	<i>ciliatum</i> Lam.....	162
<i>Alterniflora group</i>	138	<i>ciliatum</i> Rottb.....	238
<i>alterniflorum</i>	139	<i>ciliiferum</i> 105, 106	
<i>altissimum</i>	193	<i>circulare</i> 4, 183, 184, 185	
<i>amazonicum</i>	224	<i>clavuliferum</i> 151, 152	
<i>ambiguum</i>	137	<i>cognatissimum</i>	154
<i>amphicarpum</i>	161	<i>comosum</i>	223
<i>amplum</i>	188	<i>compressicaule</i>	123
<i>ancylocarpum</i>	222	<i>compressum</i> Raf.....	238
<i>anemotum</i>	137	<i>compressum</i> Rasp.....	239
<i>angustifolium</i> LeConte..... 179, 180		<i>confertum</i> 36, 37, 226	
<i>angustifolium</i> Nees..... 71, 72, 73		<i>Conjugata group</i>	162
<i>antillense</i>	215	<i>conjugatum</i> 5, 162, 163, 229	
<i>appendiculatum</i>	239	<i>parviflorum</i>	163
<i>appressum</i>	239	<i>pubescens</i>	168
<i>approximatum</i> 71, 143		<i>subcordatum</i>	239
<i>arenarium</i>	94	<i>tristachyum</i>	163
<i>arenicolum</i>	232	<i>consersum</i> 112, 200, 204	
<i>argyrocondylon</i>	70	<i>contractum</i>	25
<i>aristatum</i>	239	<i>convexum</i> 222, 223	
<i>arsenei</i>	63	<i>corcovadense</i> 111, 134, 135	
<i>arundinaceum</i> 197, 206, 208		<i>Corcovadensia group</i>	111
<i>atrocarpum</i>	215	<i>cordovense</i>	123
<i>aureum</i>	239	<i>coromandelianum</i>	224
<i>australe</i> 179, 180, 183			

	Page		Page
<i>Paspalum Coryphaea</i> group.....	211	<i>Paspalum elliottii</i>	48
<i>coryphaeum</i>	2, 211, 213	<i>elongatum</i>	229
<i>costaricense</i>	115, 116	<i>epile</i>	87, 88
<i>crassum</i>	40	<i>erectum</i>	189
<i>crinitum</i>	59	<i>erianthum</i>	27
<i>cubense</i>	239	<i>eriophorum</i>	76, 169
<i>cujabense</i>	15	<i>eristachyum</i>	94
<i>culiacanum</i>	103	<i>erucaeforme</i>	239
<i>curtisianum</i>	187	<i>falcula</i>	151, 152
<i>curvistachyum</i>	94	<i>familiare</i>	211, 213
<i>cuyabense</i>	16	<i>Fasciculata</i> group.....	176
<i>cymbiforme</i>	20	<i>fasciculatum</i>	176, 177
<i>cynosuroides</i>	239	<i>glabratum</i>	177
<i>dactylon</i>	239	<i>fernandezianum</i>	47
<i>dasyphyllum</i>	79	<i>ferrugineum</i>	113, 169
<i>debile</i> Michx.....	3, 75, 77, 78, 80	<i>filiforme</i> Flügge.....	239
<i>debile</i> Muhl.....	74, 75	<i>filiforme</i> Swartz.....	127, 141, 142
<i>decumbens</i> Rottb.....	92, 238	<i>Filiformia</i> group.....	140
<i>decumbens</i> Sagot.....	215	<i>filostachyum</i>	240
<i>decumbens</i> Swartz.....	92	<i>fimbriatum</i>	235
<i>Decumbentia</i> group.....	11, 91	<i>flaccidum</i>	138
<i>densum</i>	207, 210	<i>floribundum</i>	134
<i>denticulatum</i>	57	<i>Floridana</i> group.....	190
<i>depressum</i>	239	<i>floridanum</i> Michx.....	191,
<i>didactylum</i>	42	192, 193, 194, 196	
<i>difforme</i>	190	<i>glabratum</i>	193, 194
<i>diffusum</i>	238	<i>floridanum</i> Trin.....	233
<i>digitaria</i> C. Muell.....	239	<i>fluitans</i>	32
<i>digitaria</i> Poir.....	46, 47	<i>foliosum</i>	41
<i>digitatum</i>	239	<i>fournierianum</i>	240
<i>Dilatata</i> group.....	169	<i>frankii</i>	32
<i>dilatatum</i>	4, 169, 173	<i>furcatum</i>	240
<i>decumbens</i>	170	<i>filiforme</i>	240
<i>parviflorum</i>	173, 174	<i>parviflorum</i>	240
<i>paucispica</i>	170	<i>villosum</i>	240
<i>sacchariferum</i>	170	<i>fuscatum</i>	238
<i>dimidiatum</i>	7, 29	<i>galmarra</i>	123
<i>dispar</i>	96	<i>Gardneriana</i> group.....	230
<i>Dissecta</i> group.....	7, 28	<i>gardnerianum</i>	230
<i>dissectum</i> L.....	7, 28, 29, 30, 127, 224	<i>oligostachyum</i>	230
<i>dissectum</i> Swartz.....	127	<i>vestitum</i>	230
<i>dissectum</i> Walt.....	77	<i>geminum</i>	56
<i>distachyon</i> Poit.....	45	<i>Genera excluded from</i>	6, 7
<i>distachyon</i> Willd.....	64	<i>geniculatum</i> Raf.....	239
<i>distichophyllum</i>	21	<i>geniculatum</i> Steud.....	158
<i>Disticha</i> group.....	41	<i>giganteum</i>	195
<i>distichum</i>	5,	<i>glaberrimum</i>	188, 189
7, 10, 42, 46, 47, 48, 49, 52		<i>glabratum</i>	194
<i>anpinense</i>	42	<i>glabrum</i> Bose.....	191, 192
<i>digitaria</i>	48	<i>glabrum</i> Cassidy.....	240
<i>littorale</i>	42	<i>glabrum</i> Poir.....	134, 135
<i>nanum</i>	42	<i>gracile</i> LeConte.....	214
<i>paspalodes</i>	48	<i>gracile</i> Poir.....	129
<i>tristachyum</i>	42	<i>gracile</i> Rudge.....	32, 33
<i>vaginatum</i>	42	<i>gracile</i> Schlecht.....	17
<i>distortum</i>	141, 142	<i>gracillimum</i>	127
<i>dolichophyllum</i>	139	<i>griseum</i>	174
<i>dolichopus</i>	76	<i>guadaloupense</i>	240
<i>drummondii</i>	29, 105	<i>guatemalense</i>	102
<i>dubium</i>	78	<i>guineense</i>	123
<i>echinotrichum</i>	25	<i>haenkeanum</i>	107
<i>economic importance of</i>	3	<i>hallii</i>	54
<i>edmondi</i>	156	<i>hartwegianum</i>	5, 58, 59
<i>effusum</i>	154, 239	<i>helleri</i>	135
<i>eggertii</i>	87, 88	<i>hemicryptum</i>	222
<i>elatum</i>	206	<i>hemisphericum</i>	122
<i>elegans</i>	113	<i>heterophyllum</i>	129

	Page		Page
<i>Paspalum heteropodium</i>	95	<i>Paspalum Livida</i> group.....	53
<i>heterotrichon</i>	17	<i>lividum</i>	5, 53, 57, 59
<i>paucispicatum</i>	18	<i>lloydii</i>	95
<i>hirsutum</i>	76	<i>longepedunculatum</i>	3,
<i>hitchcockii</i>	160	74, 75, 88, 128	
<i>horticola</i>	151	<i>longicilium</i>	195
<i>maritimum</i>	149	<i>longicuspe</i>	35
<i>humboldtianum</i>	21, 22	<i>longiflorum</i>	43
<i>humifusa</i>	240	<i>longifolium</i>	143
<i>humile</i>	224	<i>longipilum</i>	182, 183, 185
<i>incertum</i>	76	<i>longissimum</i>	163, 195
<i>infirmum</i>	78	<i>guadalupense</i>	240
<i>inflatum</i>	42	<i>macrophyllum</i>	110
<i>inops</i>	222	<i>piliferum</i>	110
<i>major</i>	222	<i>macrospermum</i>	191, 192
<i>insulare</i>	140, 145	<i>maculatum</i>	150
<i>intermedium</i>	203	<i>maculosum rotundiflorum</i>	70
<i>interruptum</i>	233	<i>Malacophylla</i> group.....	228
<i>ischnocaulon</i>	134	<i>malacophyllum</i>	8, 213, 228
<i>jaliscanum</i>	114, 115	<i>ciliatum</i>	229
<i>jimenezii</i>	159	<i>glabrescens</i>	228
<i>karwinskyi</i>	208	<i>petiolatum</i>	229
<i>kearneyi</i>	188, 189	<i>manabiense</i>	39
<i>kentuckiense</i>	75	<i>mandiocanum</i>	116
<i>kleinianum</i>	41	<i>marginatum</i>	214
<i>koleopodium</i>	135	<i>megaphyllum</i>	143
<i>laeve</i>	2, 4, 179, 180, 183, 185	<i>melanospermum</i>	215, 224, 227
<i>altissimum</i>	194	<i>membranaceum</i>	8, 29
<i>angustifolium</i>	179	<i>michauxianum</i>	47
<i>australe</i>	180	<i>villosum</i>	240
<i>brevifolium</i>	179, 180	<i>microstachyum</i>	154
<i>circulare</i>	184	<i>miliare</i>	134
<i>floridanum</i>	192	<i>milioideum</i>	134
<i>pilosum</i>	182	<i>millegrana</i>	206, 207
<i>undulosum</i>	179	<i>minus</i>	65, 67
<i>Laevia</i> group.....	2, 7, 178	<i>modestum</i>	221
<i>laevigatum</i>	192	<i>molle</i>	129, 131, 132
<i>laeviglume</i>	56	<i>mononeuron</i>	239
<i>lagascae</i>	113	<i>monostachyum</i> Hort.....	101
<i>lanatum</i>	169, 240	<i>monostachyum</i> Salzm.....	98
<i>lanceaefolium</i>	129	<i>monostachyum</i> Vasey.....	101
<i>langei</i>	104, 105, 106, 108	<i>monostachyum</i> Willd.....	98
<i>lanuginosum</i>	187	<i>montevidense</i>	214
<i>larrañagai</i>	174	<i>motembense</i>	219, 221
<i>laticulmum</i>	240	<i>mucronatum</i>	32
<i>latifolium</i>	86	<i>muhlenbergii</i>	83, 86
<i>laxum</i>	134, 135, 136, 138	<i>multicaule</i>	10, 68, 149
<i>lamarckianum</i>	135	<i>multiflorum</i>	214
<i>lecomteanum</i>	179	<i>multispica</i>	123
<i>lenormandi</i>	158	<i>mutabile</i>	61
<i>lenticulare</i>	214	<i>nanum</i>	144
<i>lentiferum</i>	58, 187, 192	<i>natans</i>	32
<i>lentiginosum</i>	120, 121, 203, 208	<i>neesii</i>	72, 73
<i>leoninum</i>	146, 147	<i>nelsoni</i>	203
<i>leptachne</i>	220	<i>nesiotes</i>	117
<i>leptocaulon</i>	141	<i>Notata</i> group.....	63
<i>leptos</i>	214	<i>notatum</i>	5, 64, 67
<i>leptostachyum</i>	76	<i>latiflorum</i>	64
<i>leucocheilum</i>	197	<i>nutans</i>	94
<i>liebmanni</i>	113	<i>oajacense</i>	8, 47
<i>lindenianum</i>	140,	<i>oaxacense</i>	47
141, 142, 143, 146		<i>oligostachyum</i>	119, 120
<i>lineare</i> Fourn.....	104, 129	<i>molle</i>	119, 120
<i>lineare</i> Swartz.....	141	<i>pilosum</i>	120
<i>lineare</i> Trin.....	71, 72	<i>olivaceum</i>	224, 225
<i>Linearia</i> group.....	71	<i>Orbiculata</i> group.....	157
<i>littorale</i>	41, 42	<i>orbiculatum</i>	157

	Page		Page
<i>Paspalum oricola</i>	105, 106, 108	<i>Paspalum pubiflorum</i>	4, 53, 56, 215
<i>orthos</i>	214	<i>glabrum</i>	4, 55, 56
<i>ovatum</i>	169, 170, 173	<i>glaucum</i>	54
<i>grandiflorum</i>	169, 170	<i>viride</i>	53
<i>parviflorum</i>	173	<i>pulchellum</i>	231, 232
<i>pallidum</i>	10	<i>pumilum</i>	68
<i>palmeri</i>	109	<i>punctatum</i>	240
<i>Paniculata</i> group.....	117	<i>punctulatum</i>	179
<i>paniculatum</i> .. 7, 33, 121, 122, 123		<i>purpurascens</i>	226
<i>minor</i>	123	<i>purpureum</i>	39
<i>rigidum</i>	123	<i>purpusii</i>	240
<i>panicum</i>	210	<i>pusillum</i>	157
<i>papillosum</i>	149	<i>pyramidale</i>	32, 33
<i>Parviflora</i> group.....	148	<i>racemosum</i> Lam.....	8, 38
<i>parviflorum</i> Desv.....	129	<i>racemosum</i> Nutt.....	233, 240
<i>parviflorum</i> Rohdé.....	152	<i>racemulosum</i>	233
<i>humilis</i>	153	<i>raunkiaerii</i>	240
<i>paspaloides</i>	48	<i>rectum</i>	101
<i>villosum</i>	240	<i>longispicatum</i>	101
<i>paucispicatum</i>	52	<i>reimarioides</i>	42
<i>pauperculum</i>	215	<i>remotum</i>	54
<i>altius</i>	215	<i>glaucum</i>	54
<i>peckii</i>	97	<i>renggeri</i>	163
<i>pectinatum</i>	24	<i>repens</i>	5, 8, 31
<i>pedunculare</i>	170	<i>reptans</i>	42
<i>pedunculatum</i>	8, 92	<i>reptatum</i>	160
<i>phonoliticum</i>	137	<i>rhizomatosum</i>	135
<i>pictum</i>	150	<i>richardii</i>	134
<i>pilosum</i> Lam..... 8, 97, 98, 107		<i>rigidifolium</i>	90
<i>pilosum</i> Spreng.....	240	<i>robustum</i>	113
<i>pittieri</i>	151, 152	<i>rocanum</i>	138
<i>planifolium</i>	53, 55	<i>rosei</i>	240
<i>plantagineum</i>	134	<i>rottboellioides</i>	140
<i>platense</i>	169	<i>rudimentosum</i>	239
<i>platicaulon</i>	240	<i>rupestre</i>	145, 146, 147
<i>platyaxis</i>	207	<i>Rupestria</i> group.....	145
<i>platycaule</i>	240	<i>saccharoides</i>	8, 9, 236
<i>platyphyllum</i>	240	<i>saltense</i>	64, 65
<i>plenipilum</i>	182	<i>salzmanni</i>	119, 120
<i>plenum</i>	202, 203, 208	<i>sanguinale</i>	240
<i>pleostachyum</i>	137, 138	<i>sanguineolentum</i>	27
<i>Plicatula</i> group.....	213	<i>saugetii</i>	130, 146, 147
<i>plicatulum</i>	2,	<i>saxatile</i>	215
118, 134, 188, 214, 215		<i>scabriusculum</i>	38
<i>intumescens</i>	215	<i>scabrum</i>	38
<i>microspermum</i>	224, 225	<i>schaffneri</i>	47, 108
<i>subrotundum</i>	120	<i>schreberianum</i>	206, 208
<i>plicatum</i>	215	<i>sciaphilum</i>	131
<i>poiretii</i>	129, 147	<i>scrobiculatum</i>	3, 224,
<i>polyphyllum</i>	22	227, 228	
<i>polystachium</i>	123	<i>frumentaceum</i>	228
<i>polystachyum</i>	237	<i>scutatum</i>	235
<i>portoricense</i>	131	<i>secans</i>	204, 206
<i>praecox</i>	186, 188, 189	<i>selloi</i>	169
<i>curtisianum</i>	188	<i>senescens</i>	104
<i>praelongum</i>	184, 185	<i>sericeum</i>	240
<i>propinquum</i>	86, 89, 90	<i>serotinum</i>	240
<i>prostratum</i> Nash.....	80	<i>serpens</i>	158
<i>prostratum</i> Scribn. & Merr.....	35	<i>serpentinum</i>	70
<i>pygmaeum</i>	36	<i>serratum</i>	30
<i>protensum</i>	94, 95	<i>Setacea</i> group.....	2, 7, 73
<i>pruinsum</i>	211, 213	<i>setaceum</i> 2, 3, 75, 76, 78, 84, 86	
<i>psammophilum</i>	80, 81	<i>ciliatifolium</i>	87
<i>pubescens</i> Lag.....	113	<i>longepedunculatum</i>	75
<i>pubescens</i> Muhl.....	2, 3, 4,	<i>pubiflorum</i>	109, 110
76, 80, 83, 84, 86, 88		<i>supinum</i>	79
<i>muhlenbergii</i>	83	<i>sieberianum</i>	163

	Page		Page
<i>Paspalum simpsoni</i>	127	<i>Paspalum villosum</i>	240
<i>singularis</i>	94	<i>violascens</i>	212, 213
<i>sinuosum</i>	134	Virgata group.....	198
<i>solitarium</i>	101	<i>virgatum</i> L.....	4, 7, 9, 28, 134, 188, 197, 198, 200, 201, 206, 214
<i>spathaceum</i>	86	<i>ciliatum</i>	197
<i>splendens</i>	16	<i>glabriusculum</i>	207
<i>sphacelatum</i>	16	<i>jacquinianum</i>	197, 207
<i>squamatum</i>	42	<i>linneanum</i>	197
<i>squamulatum</i>	104, 118, 119	<i>parviflorum</i>	173
<i>standleyi</i>	153	<i>platyaxon</i>	207
<i>stellatum</i>	8, 15, 16	<i>pubiflorum</i>	173, 174
<i>distachyum</i>	15	<i>purpurascens</i>	226
<i>hirsutum</i>	16	<i>schreberianum</i>	206, 207, 208
<i>monostachyum</i>	15	<i>stramineum</i>	197, 206
<i>stoloniferum</i>	8, 39	<i>willdenowianum</i>	197
<i>stramineum</i>	2, 3, 81, 82	<i>virgatum</i> Walt.....	225
<i>strictum</i>	123, 240	<i>virletii</i>	116
<i>strigosum</i>	68	<i>vulnerans</i>	207
<i>subciliatum</i>	69	<i>wagenerianum</i>	16
<i>sumichrasti</i>	118, 119	<i>walteri</i>	29
<i>supinum</i> Bosc.....	3, 79, 84	<i>walterianum</i>	29
<i>supinum</i> Rich.....	239	weedy species of.....	5, 33, 124, 165
<i>supinum</i> Rupr.....	123	<i>wrightii</i>	219, 220, 221
<i>supinum</i> Sieber.....	95	<i>yaguaronense</i>	225
<i>swartzianum</i>	141	<i>yucatanum</i>	121
<i>taphrophyllum</i>	64	<i>Paspalus</i>	7
<i>tardum</i>	188, 189	Pasture grasses.....	4, 5, 33, 49, 56, 65, 84, 170, 174, 180, 183, 185, 227
<i>tectum</i>	29	<i>Patrinia rupestris</i>	666
<i>tenacissimum</i>	135	Pearl millet.....	3
<i>tenellum</i>	112, 113	<i>Pedicularis</i>	564, 587, 588
<i>bourgaei</i>	113	<i>alaschanica</i>	659
<i>tenue</i>	162, 179, 214, 240	<i>anas</i>	659
<i>tinctum</i>	62	<i>armata</i>	659
<i>tonduzii</i>	115	<i>chingii</i>	659
<i>trachycoleon</i>	19	<i>kansuensis</i>	659
<i>triglume</i>	239	<i>musculicola</i>	659
<i>tristachyon</i>	240	<i>rhinanthoides</i>	659
<i>tristachyum</i>	41, 232	<i>rudis</i>	659
<i>tumidum</i>	40	<i>striata</i>	659
type specimens of.....	2	<i>torta</i>	660
<i>umbratile</i>	132	<i>Peganum harmala</i>	640
<i>umbrosum</i>	131	<i>nigellastrum</i>	640
<i>underwoodii</i>	208	<i>Penicillus capitatus</i>	554
<i>undulatum</i>	214	<i>Pennisetum</i>	3
<i>undulosum</i>	179	<i>flaccidum</i>	597
<i>uniflorum</i>	240	<i>Pentapterygium</i>	316
<i>uniseriatum</i>	37	<i>Periclesia</i>	329, 332, 357
<i>unispicatum</i>	98, 99, 100	<i>flexuosa</i>	357
<i>urvillei</i>	4, 169, 173, 198	<i>Pertya discolor</i>	671
<i>usteri</i>	213	<i>sinensis</i>	672
<i>vaginatum</i> Ell.....	29	<i>Phaeophyceae</i>	554
<i>vaginatum</i> Swartz.....	5, 10, 41, 42, 43, 44, 49	<i>Phalaris arundinacea</i>	597
<i>longipes</i>	42	<i>Phelipaea salsa</i>	611, 661
<i>nanum</i>	42, 44	<i>Philadelphus</i>	587
<i>pleostachyum</i>	176	<i>pekinensis kansuensis</i>	591, 626
<i>pubescens</i>	47	<i>Phleum alpinum</i>	598, 599
<i>reimarioides</i>	42	<i>Phlomis mongolica</i>	657
<i>vaginiflorum</i>	92	<i>Phragmites communis</i>	598
<i>variabile</i>	105, 107, 108	<i>Picea</i>	587
<i>varians</i>	110	<i>asperata</i>	589, 590, 592, 593, 594
<i>variegatum</i>	43	<i>purpurea</i>	592, 593
<i>vaseyanum</i>	174	<i>wilsonii</i>	593
<i>velutinum</i>	170, 240	<i>Picris hieracioides japonica</i>	672
<i>vestitum</i>	152	<i>Pinaceae</i>	593
<i>villifolium</i>	222		
<i>villosissimum</i>	78		

	Page		Page
<i>Pinus</i>	587	<i>Primula sataniensis</i>	649
<i>armandi</i>	593, 594	<i>stenocalyx</i>	649
<i>tabulaeformis</i>	589, 594	<i>urticifolia</i>	650
<i>Piptanthus mongolicus</i>	638	<i>woodwardii</i>	650
<i>Plantaginaceae</i>	661	<i>Primulaceae</i>	564, 649
<i>Plantago</i>	564	<i>Prinsepia uniflora</i>	630
<i>depressa</i>	661	<i>Proclesia</i>	314, 446
<i>lessingii</i>	661	<i>acuminata</i>	503
<i>major</i>	662	<i>alata</i>	509
<i>Pleurospermum kansuense</i>	647	<i>benthamiana</i>	503
<i>longicaule</i>	647	<i>bracteata</i>	490
<i>Plumbagella micrantha</i>	650	<i>capitata</i>	507
<i>Plumbaginaceae</i>	650	<i>cordata</i>	487
<i>Poa acroleuca</i>	598	<i>cordifolia</i>	487
<i>arctica</i>	598	<i>hartwegiana</i>	489
<i>attenuata vivipara</i>	598	<i>melastomoides</i>	503
<i>nemoralis</i>	598	<i>pseudopubescens</i>	502
<i>sphondylodes</i>	598	<i>pubescens</i>	485
<i>Podophyllum emodi</i>	620	<i>scabriuscula</i>	490
<i>Polemoniaceae</i>	654	<i>splendens</i>	505
<i>Polemonium caeruleum villosum</i>	654	<i>strobilifera</i>	509
<i>Polyboea</i>	314, 446, 457	<i>veraguensis</i>	461
<i>crassifolia</i>	457	<i>warszewiczii</i>	463
<i>laurifolia</i>	456	<i>Prunus</i>	587, 591, 592
<i>quereme</i>	495	<i>mongolica</i>	630
<i>velutina</i>	485	<i>padus</i>	631
<i>Polygala sibirica</i>	641	<i>salicina</i>	631
<i>Polygalaceae</i>	641	<i>sibirica</i>	631
<i>Polygonaceae</i>	610	<i>stipulacea</i>	631
<i>Polygonatum fuscum</i>	603	<i>tangutica</i>	631
<i>multiflorum</i>	603	<i>tomentosa</i>	631
<i>sibiricum</i>	603	<i>triloba multiplex</i>	631
<i>Polygonum</i>	564, 587	<i>Psammisia</i>	312,
<i>amphibium</i>	610	314, 323, 325, 326, 332, 384	
<i>auberti</i>	610	<i>alpicola</i>	376
<i>aviculare</i>	610	<i>bicolor</i>	401
<i>cyanandrum</i>	610	<i>breviflora</i>	387
<i>lapathifolium salicifolium</i>	610	<i>coarctata</i>	401, 508
<i>macrophyllum</i>	610	<i>columbiensis</i>	398
<i>nepalense</i>	610	<i>coriacea</i>	423
<i>pilosum</i>	610	<i>costaricensis</i>	377
<i>sibiricum</i>	611	<i>cyathifera</i>	384, 401
<i>tataricum</i>	611	<i>ecuadorensis</i>	390
<i>viviparum</i>	611	<i>elegans</i>	397
<i>Populus</i>	587, 591	<i>elliptica</i>	395
<i>cathayana</i>	605	<i>engleriana</i>	401
<i>euphratica</i>	605	<i>falcata</i>	384, 398, 399, 401
<i>simonii</i>	579, 586, 605	<i>ferruginea</i>	391
<i>suaveolens</i>	577, 605	<i>formosa</i>	420
<i>tremula davidiana</i>	586,	<i>glabra</i>	377
589, 590, 605		<i>globosa</i>	388
<i>Potentilla</i>	587, 589	<i>graebneriana</i>	389
<i>anserina</i>	629	<i>grandiflora</i>	392, 396
<i>bifurca</i>	629	<i>guianensis</i>	394, 399, 523
<i>chinensis</i>	629	<i>hookeriana</i>	325, 404, 406
<i>fruticosa parvifolia</i>	630	<i>jessicae</i>	404
<i>veitchii</i>	630	<i>killipii</i>	395
<i>leschenaultiana</i>	630	<i>kraenzliniana</i>	390
<i>salesoviana</i>	630	<i>lanceolata</i>	398, 402
<i>subacaulis</i>	630	<i>lehmannii</i>	389, 421
<i>viscosa</i>	630	<i>leucostoma</i>	399, 400
<i>Prenanthes alba</i>	672	<i>longicolla</i>	406
<i>tatarinowii</i>	672	<i>longifolia</i>	414
<i>macrantha</i>	672	<i>macrophylla</i>	398, 402
<i>Primula</i>	590	<i>nitida</i>	376
<i>algida</i>	649	<i>oblongifolia</i>	406
<i>gemmaifera</i>	649	<i>pauciflora</i>	394, 400

	Page		Page
<i>Psammisia penduliflora</i>	325, 403, 405, 406	<i>Riedelia clonantha</i>	525
<i>pennellii</i>	386, 392	<i>fendleriana</i>	528
<i>planchoniana</i>	403	<i>panurensis</i>	522
<i>puberula</i>	390, 391	<i>warszewiczii</i>	525
<i>ramiflora</i>	392	Rivulariaceae	552
<i>recurvata</i>	396	Rosa	587, 591
<i>rhododelphis</i>	425	<i>bella</i>	631
<i>rupestris</i>	376	<i>davidii</i>	593, 632
<i>sarcantha</i>	404	<i>omeiensis</i>	632
<i>sclerophylla</i>	406	<i>rugosa chamissoniana rubro-</i>	
<i>sodiroid</i>	397	<i>plena</i>	632
<i>symphystemona</i>	392	<i>willmottiae</i>	632
<i>tovarensis</i>	404	<i>xanthina</i>	589
<i>ulbrichiana</i>	405, 406	<i>spontanea</i>	632
<i>ulei</i>	399	Rosaceae	627
<i>urbaniana</i>	401	Roseningea sanctae-crucis	554
<i>urichiana</i>	393, 395, 400	Rubia cordifolia	662
<i>weberbaueri</i>	401	Rubiaceae	662
<i>Pseudoceresia</i> , subsection	7, 28	Rubus	587, 592
<i>Pterocephalus hookeri</i>	666	<i>amabilis</i>	632
<i>Pucapinchichu</i>	342	<i>idaeus</i>	632
<i>Puccinia porri</i>	602	<i>parvifolius</i>	632
<i>Pucosato</i>	438	<i>pileatus</i>	632
<i>Puechato sumacmisqui</i>	438	<i>pungens</i>	632
<i>Pyrola rotundifolia chinensis</i>	590, 648	<i>stans</i>	632
<i>Pyrus pashia</i>	631	<i>xanthocarpus</i>	633
<i>Quercus mongolica</i>	608	Rumex	564
<i>Quereme</i>	495	<i>crispus</i>	611
<i>Raddi</i> , types of	1	<i>gmelini</i>	611
Ranunculaceae	564, 614	<i>nepalensis</i>	611
<i>Ranunculus affinis</i>	617	Rusbya	314, 317, 324, 333, 445
<i>capillaceus</i>	618	<i>boliviana</i>	446
<i>arcuans</i>	618	<i>pearcei</i>	446
<i>hirtellus</i>	618	<i>taxifolia</i>	324, 445
<i>kamchaticus</i>	617	Rutaceae	641
<i>plantaginifolius</i>	618	<i>Sabsab</i>	7
<i>pulchellus</i>	618	<i>Saccharum caudatum</i>	9
<i>Raphanus sativus</i>	623	<i>contractum</i>	9
<i>Rehmannia glutinosa</i>	660	<i>dubium</i>	9
<i>Reimaria</i>	8	<i>polystachyum</i>	9, 236, 237
<i>acuta</i>	8	Sagalita	373, 490
<i>candida</i>	8, 36, 37	Salapa	490
<i>elegans</i>	8, 231	Salicaceae	605
<i>Reimarochloa</i>	8	Salix	564, 587, 589, 591
Rhamnaceae	643	<i>caprea</i>	605, 607
<i>Rhamnus leptophyllus</i>	643	<i>cheilophila</i>	606
<i>parvifolius</i>	643	<i>chingiana</i>	606
<i>Rheum delavayi</i>	611	<i>dissa</i>	606
<i>leucorrhizum</i>	611	<i>matsudana</i>	586, 606
Rhizophyllidaceae	556	<i>melea</i>	606
<i>Rhododendron</i>	587	<i>microstachya</i>	606
<i>agglutinatum</i>	591, 648	<i>paraplesia</i>	606
<i>anthopogonoides</i>	591, 648	<i>phylicifolia</i>	606
<i>capitatum</i>	591, 648	<i>plocotricha</i>	606
<i>rufum</i>	586, 592, 648	<i>spathulifolia</i>	606
<i>thymifolium</i>	591, 648	<i>wallichiana</i>	607
Rhodomelaceae	559	<i>wuiana</i>	607
Rhodophyceae	555	Salsola arbuscula	612
Rhodophyllidaceae	558	<i>kali</i>	612
<i>Ribes</i>	587, 591	Salvia przewalskii	657
<i>emodense verruculosum</i>	627	<i>roborowskii</i>	657
<i>giraldii</i>	627	Sambucus adnata	664
<i>meyeri</i>	627	<i>wightiana</i>	664
<i>pulchellum</i>	627	<i>Sanguinaria vaginata</i>	42
<i>stenocarpum</i>	627	Sanguisorba officinalis	633
<i>Riedelia</i>	314, 519	Sapindaceae	643
<i>bahiensis</i>	522		

	Page		Page
<i>Sargassum platycarpum</i>	555	<i>Semiramisia speciosa</i>	348, 349
<i>polyceratium</i>	555	<i>weberbaueri</i>	349
<i>Satyria</i>	314,	<i>Senecio acerifolius</i>	675
320, 330, 331, 333, 468,	519	<i>argunensis</i>	674
<i>breviflora</i>	530	<i>kaschkarowi</i>	674
<i>clonantha</i>	525, 526	<i>nemorensis</i>	674
<i>elongata</i>	521	<i>roborowskii</i>	674
<i>grandifolia</i>	526	<i>thianschanicus</i>	675
<i>latifolia</i>	468, 527	<i>winklerianus</i>	675
<i>meiantha</i>	528	<i>Serratula centauroides</i>	675
<i>minutiflora</i>	529	<i>Setaria</i>	3
<i>neglecta</i>	520	<i>viridis</i>	598
<i>nitida</i>	528	<i>Sibbaldia procumbens</i>	633
<i>ovata</i>	524	<i>Sibiraea</i>	587
<i>panurensis</i>	400, 522	<i>laevigata angustata</i>	591, 592, 633
<i>pilosa</i>	524	<i>Silene conoidea</i>	613
<i>toroi</i>	530	<i>repens</i>	614
<i>triloba</i>	523	<i>tenuis</i>	614
<i>ulei</i>	522	<i>Siltgrass</i>	5, 49
<i>warzsewiczii</i>	519, 522, 525, 527	<i>Siphonandra</i>	312, 314,
<i>Saussurea</i>	564, 588	321, 326, 327, 329, 332, 355	355, 356
<i>acroura</i>	672	<i>elliptica</i>	355, 356
<i>chingiana</i>	672	<i>pilosa</i>	355
<i>graminea ortholepis</i>	673	<i>Siphonostema</i>	355
<i>japonica</i>	673	<i>costatum</i>	355
<i>kansuensis</i>	673	<i>myrtifolium</i>	356
<i>katochaete</i>	673	<i>Smilax stans</i>	603
<i>likiangensis siningensis</i>	673	<i>Socratesia</i>	446
<i>otophylla</i>	673	<i>melastomoides</i>	454
<i>parviflora cuspidata</i>	673	<i>Soil binders</i>	5, 44, 49
<i>phaeantha</i>	673	<i>Solanaceae</i>	658
<i>runcinata dentata</i>	673	<i>Solanum nigrum</i>	658
<i>stella</i>	673	<i>septemlobum</i>	658
<i>superba</i>	673	<i>Sonchus brachyotus</i>	675
<i>ussuriensis</i>	674	<i>Sophoclesia</i>	320
<i>Saxifraga atrata</i>	626	<i>apophysata</i>	516
<i>egregia</i>	626	<i>Sophora alopecuroides</i>	639
<i>giraladiana biondiana</i>	626	<i>Sorbaria</i>	587
<i>montana</i>	626	<i>arborea</i>	591, 633
<i>pseudohirculus</i>	626	<i>glabrata</i>	633
<i>tangutica minutiflora</i>	626	<i>Sorbus</i>	587, 591
<i>Saxifragaceae</i>	625	<i>hupehensis</i>	633
<i>Scirpus maritimus</i>	600	<i>koehneana</i>	633
<i>Scorzonera austriaca</i>	674	<i>tapashana</i>	633
<i>capito</i>	674	<i>Soroseris hookeriana erysimoides</i>	675
<i>divaricata</i>	674	<i>Sour-grass</i>	165
<i>mongolica</i>	674	<i>Sphyrospermum</i>	320
<i>Scrofella chinensis</i>	660	<i>Spiraea</i>	589
<i>Scrophularia alaschanica</i>	660	<i>canescens glaucophylla</i>	633
<i>delavayi</i>	660	<i>fritschiana</i>	634
<i>incisa</i>	660	<i>gemmata</i>	634
<i>Scrophulariaceae</i>	564, 658	<i>hypericifolia</i>	634
<i>Scutellaria baikalensis</i>	657	<i>longigemmis</i>	634
<i>rivularis</i>	657	<i>Spiranthes sinensis</i>	605
<i>Securinega ramiflora</i>	642	<i>Splachnum</i>	471
<i>Sedum</i>	564	<i>Sporobolus indicus</i>	129
<i>aizoon angustifolia</i>	624	<i>Spyridia filamentosa</i>	559
<i>crassipes</i>	624	<i>Stachys baikalensis</i>	657
<i>dumulosum</i>	624	<i>Statice aurea</i>	650
<i>elatinoides</i>	624	<i>bicolor</i>	650
<i>fimbriatum</i>	624	<i>schrenkiana aff</i>	650
<i>quadrifidum fastigiatum</i>	624	<i>Stellaria graminea</i>	614
<i>roseum</i>	625	<i>pilosula</i>	614
<i>telephium angustum</i>	625	<i>infracta</i>	614
<i>Semiaquilegia simulatrix</i>	615	<i>Stellera chamaejasme</i>	645
<i>Semiramisia</i>	314, 329, 332, 348, 392	<i>Stereosanthus sp.</i>	675
<i>karsteniana</i>	348		

	Page		Page
<i>Stipa breviflora</i>	598	<i>Thibaudia breviflora</i>	387
<i>chingii</i>	598	<i>capitata</i>	507
<i>inebrians</i>	599	<i>caulialata</i>	438, 509
<i>purpurascens</i>	598	<i>cerander</i>	438
<i>sibirica</i>	598	<i>cinnamomifolia</i>	485
<i>splendens</i>	599	<i>coarctata</i>	401
<i>Streptopus amplexifolius</i>	603	<i>cordifolia</i>	487
<i>Suaeda obtusifolia</i>	612	<i>coronaria</i>	344
<i>stauntonii</i>	612	<i>costaricensis</i>	425, 426, 427
<i>Swainsona salsula</i>	639	<i>crassifolia</i>	457
<i>Swertia pusilla</i>	653	<i>crenulata</i>	438
<i>Syllepis</i>	9	<i>cupatensis</i>	421
<i>polystachya</i>	9, 237	<i>cyathifera</i>	401
<i>ruprechtii</i>	9	<i>dependens</i>	442
<i>Symploca hydroides</i>	552	<i>diphylla</i>	438
<i>Syntherisma</i>	6	<i>domingensis</i>	439
<i>filiforme</i>	141	<i>elliptica</i>	356
<i>longiflora</i>	43	<i>emarginata</i>	347
<i>sanguinalis</i>	9	<i>engleriana</i>	416
<i>Syringa</i>	587	<i>falcata</i>	401
<i>oblata</i>	650	<i>floribunda</i>	410, 413, 415
<i>alba</i>	589, 650	<i>formosa</i>	420
<i>giraldii</i>	589, 650	<i>glandulifera</i>	422
<i>pekinensis</i>	651	<i>graebneriana</i>	433
<i>Talquezal</i>	198	<i>harmsiana</i>	432
<i>Tamaricaceae</i>	644	<i>hendersoni</i>	503
<i>Tamarix chinensis</i>	592, 644	<i>herrerae</i>	435
<i>Taraxacum calanthodium</i>	675	<i>hirsuta</i>	339
<i>dissectum</i>	675	<i>hirtiflora</i>	382
<i>Thalassia</i>	554, 556, 557	<i>hookeri</i>	503
<i>Thalictrum baicalense</i>	618	<i>involutrata</i>	423
<i>javanicum</i>	618	<i>jahnii</i>	419
<i>petaloideum</i>	618	<i>jessicae</i>	404
<i>przewalskii</i>	618	<i>jussiaei</i>	438
<i>simplex</i>	618	<i>krugii</i>	439
<i>affine</i>	619	<i>latifolia</i>	439
<i>Themistoclesia</i>	314,	<i>laurifolia</i>	369
323, 324, 333, 425, 439, 445		<i>laxa</i>	424
<i>buxifolia</i>	340	<i>lehmannii</i>	414
<i>compacta</i>	444	<i>longifolia</i>	414
<i>coronilla</i>	344	<i>macrocalyx</i>	416
<i>dependens</i>	442	<i>macrophylla</i>	398
<i>hirsuta</i>	443	<i>martii</i>	438, 509
<i>humboldtiana</i>	441, 442	<i>melastomoides</i>	454, 503
<i>lehmannii</i>	442	<i>mellifera</i>	313, 437
<i>pendula</i>	324, 439, 441	<i>melliflora</i>	313, 410, 437
<i>peruviana</i>	442	<i>mexicana</i>	439
<i>pterocarpa</i>	449	<i>microphylla</i>	340, 341
<i>vegasana</i>	440	<i>moriciandi</i>	430, 439
<i>Thermopsis lanceolata</i>	639	<i>mucronata</i>	409
<i>Thibaudia</i>	312,	<i>multiflora</i>	437
313, 320, 321, 323, 324, 325, 327,		<i>nitida</i>	376
328, 329, 330, 332, 333, 352, 406,		<i>nutans</i>	423
410, 439, 509.		<i>oblongifolia</i>	485
<i>acuminata</i>	503	<i>obovata</i>	431
<i>alata</i>	509	<i>oceanensis</i>	438, 439
<i>andrei</i>	418	<i>ovalifolia</i>	434
<i>angustifolia</i>	431, 438	<i>ovata</i>	433
<i>anomala</i>	429	<i>pachyantha</i>	415
<i>apophysata</i>	421	<i>paniculata</i>	426, 427
<i>archeri</i>	426	<i>panurensis</i>	522
<i>ardisiaefolia</i>	438	<i>parvifolia</i>	428
<i>axillaris</i>	417	<i>penduliflora</i>	403
<i>bicolor</i>	401	<i>pennellii</i>	427
<i>biflora</i>	435	<i>phyllireaefolia</i>	430
<i>boliviensis</i>	437, 438	<i>pichinchensis</i>	413, 414
<i>bracteata</i>	490	<i>glabra</i>	404

	Page		Page
<i>Thibaudia portoricensis</i>	329, 354	<i>Ulmus macrocarpa</i>	608, 609
<i>pubescens</i>	485	<i>pumila</i>	586, 608, 609
<i>parvifolia</i>	502	<i>Ulva fasciata</i>	552
<i>punctata</i>	480	<i>lactuca</i>	552
<i>punctatifolia</i>	480	<i>Ulvaceae</i>	552
<i>quereme</i>	495	<i>Umbelliferae</i>	646
<i>racemosa</i>	407	<i>Urtica laetevirens</i>	609
<i>regularis</i>	436	<i>triangularis</i>	609
<i>rigidiflora</i>	418	<i>Urticaceae</i>	609
<i>roraimae</i>	420	<i>Uva</i>	526
<i>rupestris</i>	376, 377	<i>camarona</i>	316, 377, 489
<i>sarcantha</i>	404	<i>de anis</i>	489
<i>scabriuscula</i>	490	<i>de monte</i>	486
<i>schlimiana</i>	438	<i>Vaccinium</i> ... 312, 319, 320, 410, 439, 446	
<i>secundiflora</i>	512	<i>bicolor</i>	401
<i>septemnervia</i>	485	<i>melliflorum</i>	437
<i>serrata</i>	438	<i>smilacifolium</i>	329, 354
<i>spathulata</i>	434	<i>subcrenulatum</i>	439
<i>speciosa</i>	349	<i>Valeriana officinalis</i>	665
<i>strobilifera</i>	509	<i>rupestris</i>	665
<i>subcrenulata</i>	439	<i>tangutica</i>	665
<i>tarapotana</i>	476	<i>Valerianaceae</i>	665
<i>tetragona</i>	439	<i>Valonia ocellata</i>	553
<i>tomentosa</i>	428	<i>ventricosa</i>	553
<i>truncata</i>	424	<i>Valoniaceae</i>	552
<i>tuberosa</i>	369	<i>Vasey grass</i>	4, 174
<i>turbinata</i>	415	<i>Verbenaceae</i>	655
<i>urbaniana</i>	432	<i>Veronica anagallis</i>	660
<i>viridiflora</i>	482	<i>ciliata</i>	660
<i>wardii</i>	408	<i>tournefortii</i>	660
<i>weberbaueri</i>	431	<i>Viburnum</i>	587
<i>Thibaudieae</i> , Asiatic genera of.....	316	<i>fragrans</i>	664
<i>Thlaspi arvense</i>	622, 624	<i>lobophyllum</i>	593, 664
<i>Thrasya cultrata</i>	98	<i>mongolicum</i>	664
<i>Thuja orientalis</i>	595	<i>opulus</i>	593, 664
<i>Thymelaeaceae</i>	645	<i>veitchii</i>	664
<i>Thymus serpyllum mongolicus</i>	657	<i>Vicia amoena</i>	639
<i>Tilia chinensis</i>	593, 644	<i>cracca</i>	639
<i>Tiliaceae</i>	644	<i>sativa</i>	639
<i>Tofieldia yunnanensis</i>	604	<i>tridentata</i>	639
<i>Tongoloa elata</i>	647	<i>unijuga</i>	639
<i>Torularia humilis hygrophila</i>	624	<i>Vidalia obtusiloba</i>	559
<i>piasezkii</i>	624	<i>Viola</i>	564
<i>Trachomitum venetum</i>	653	<i>biflora</i>	645
<i>Tribulus terrestris</i>	641	<i>chingiana</i>	645
<i>Tricholaena oblecta</i>	22	<i>pinnata multifida</i>	645
<i>saccharoides</i>	237	<i>prionantha</i>	645
<i>Triglochin maritimum</i>	595	<i>Violaceae</i>	645
<i>palustre</i>	595, 600	<i>Viscum album</i>	593, 609
<i>Triosteum hirsutum</i>	664	<i>Vitaceae</i>	643
<i>Trisetum spicatum</i>	596, 599	<i>Water-couch</i>	5, 49
<i>Trollius pumilus</i>	619	<i>Water-grass</i>	4
<i>Turbinaria tricostata</i>	555	<i>Water-paspalum</i>	4, 5
<i>turbinata</i>	555	<i>Water weed</i>	5, 33
<i>Typha minima</i>	595	<i>Wirtgenia</i>	8
<i>Typhaceae</i>	595	<i>paspaloides</i>	8, 228
<i>Tyria</i>	314, 325, 360	<i>Wurdemannia miniata</i>	558
<i>salapa</i>	372	<i>setacea</i>	558
<i>Udotea flabellum</i>	554	<i>Xanthoceros sorbifolia</i>	590, 643
<i>Ulmaceae</i>	608	<i>Zizyphus</i>	586
<i>Ulmus</i>	587	<i>jujuba</i>	643
<i>dauidiana</i>	608	<i>Zygophyllaceae</i>	640
<i>glaucescens</i>	589, 608	<i>Zygophyllum mucronatum</i>	641
<i>lasiocarpa</i>	608	<i>xanthoxylum</i>	636, 641
<i>japonica</i>	608		